S. P. B.

PROCEEDINGS

OF THE

# Bournemouth Natural Science Society

Vol. 3.

SESSION 1910-11.

PROCEEDINGS OF THE

# Bournemouth Natural Science Society.

- - VOL. III - -

SESSION 1910-11

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GRANVILLE CHAMBERS, BOURNEMOUTH, 1912.

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BRITISH MUSEUM
NATURAL HISTORY

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# Introductory.

THE BOURNEMOUTH NATURAL SCIENCE SOCIETY was founded in 1903, being the successor to an older society which became defunct in 1897. Its objects are the promotion of Science in all its branches, by means of Lectures, Field Meetings, the Reading and Discussion of Papers, and the formation of Sections of its members devoted to any particular branch of the Society's work.

The Sections at present working are seven in number:— **Archæological and Historical, Botanical, Geographical, Geological, Microscopical and Zoological, Photographical,** and **Physical.**

During the WINTER SESSION, from October to April, two GENERAL MEETINGS are usually held in each month, comprising Lectures and Demonstrations on various subjects of scientific interest, illustrated by lantern slides, diagrams, or specimens. These meetings are held in Trinity Hall, Lorne Park, or in THE SOCIETY'S ROOMS, GRANVILLE CHAMBERS, RICHMOND HILL, on Saturdays, at 4.30 p.m.

The SECTIONAL MEETINGS are held at Granville Chambers on Thursdays and Saturdays, at 4.30 p.m., each Section being allotted one monthly meeting. At these, the papers read are more specialized and technical than at the General Lectures.

During the SUMMER SESSION, GENERAL EXCURSIONS to places of interest in the neighbourhood are arranged once in each month, usually on Wednesdays. SECTIONAL EXCURSIONS also take place, one in each week, on Wednesdays or Saturdays.

The management of the Society is vested in a Council, which is elected at the Annual General Meeting, held in October.

The Members are elected by the Council, and pay an annual subscription of Ten Shillings for full membership (admitting to all meetings and excursions for the year). Visitors to Bournemouth are permitted to join for the Winter or Summer Sessions on payment of Seven Shillings and Sixpence, if approved by the Council.

The Society is endeavouring to lay the foundation of a MUSEUM, by acquiring collections of archæological, botanical, geological, zoological, and other specimens of scientific interest, which are being arranged, and are open to the inspection of members, at Granville Chambers.

A MONTHLY NOTICE, giving full particulars of all meetings, etc., is posted to every member at the beginning of each month, and a volume of Proceedings is published every year.

**Application Forms for Membership, and further particulars, can be obtained from the Secretaries of the Society:—**

**T. MICHELL, Esq.,**
**Trewirgie, Wellington Road,**
**Bournemouth**
(Assistant Hon. Secretary).

**J. F. SPENCER, Esq.,**
**Glenthorne, Richmond Park Road,**
**Bournemouth**
(Assistant Secretary).

March, 1912.

# Bournemouth Natural Science Society.

## OFFICERS AND COUNCIL FOR 1911-12.

### President:

SIR RAY LANKESTER, K.C.B., M.A., LL.D., F.R.S., F.L.S.

### Vice-Presidents:

G. BROWNEN, ESQ., F.C.S.
G. E. J. CRALLAN, ESQ., M.A., M.B., M.R.C.S.
J. E. LIDDIARD, ESQ., F.R.G.S.
M.N.G.S. of U.S.A., M.J.S.
REV. E. F. LINTON, M.A.
DR. A. RANSOME, M.A., F.R.S.
MISS C. AGNES ROOPER.
DR. J. ROBERTS THOMSON, J.P.
H. J. WADDINGTON, ESQ., F.L.S.
C. J. HANKINSON, ESQ., J.P.

### Chairman of Council:

SIR DANIEL MORRIS, K.C.M.G., M.A., D.SC., D.C.L., F.L.S.

### Vice-Chairman of Council:

G. G. HAMILTON, ESQ., M.B., F.R.C.S., ENG.

### Council:

THE OFFICERS (ex-officio) and

H. BACKHOUSE, ESQ.
J. M. FRENCH, ESQ.
G. G. HAMILTON, ESQ., M.B., F.R.C.S., ENG.
SIR DANIEL MORRIS, K.C.M.G., M.A., F.L.S.
H. LE JEUNE, ESQ.
J. H. SCOTT, ESQ., M.E.
R. V. SHERRING, ESQ., F.L.S.
S. MCCALMONT HILL, ESQ., D.C.L.

### Chairmen of Sections:

Archæological and Historical: G. BROWNEN, ESQ., F.C.S.
Botanical: MISS C. AGNES ROOPER.
Geographical: G. DE CASTRO, ESQ., M.R.C.S., ENG.
Geological: DR. W. T. ORD, F.G.S.
Microscopical and Zoological; H. B. WELLS, ESQ., F.R.M.S., AND DR. CRALLAN.
Photographical: E. W. BARLOW, ESQ., F.R.A.S.
Physical: HUBERT PAINTER, ESQ., B.SC., F.C.S.

### Secretaries:

*Hon. Secretary*: SIR A. BROOKE PECHELL, BT., Hilfield, Bath Road, Bournemouth.
*Assistant Hon. Secretary:* T. MICHELL, ESQ., Trewirgie, Wellington Road, Bournemouth.
*Assistant Secretary:* J. F. SPENCER, ESQ., Glenthorne, Richmond Park Road, Bournemouth.

### Hon. Treasurer:

G. BRUMELL, ESQ., A.R.I.B.A.

### Hon. Librarian:

F. I. COOKE, ESQ.

### Hon. Auditors:

H. SUTTON, ESQ.
E. BICKER, ESQ.

### Bankers:

NATIONAL PROVINCIAL BANK OF ENGLAND, BOURNEMOUTH.

### PAST PRESIDENTS.

| | |
|---|---|
| 1903-4 .. .. .. | J. E. BEALE, ESQ., Mayor of Bournemouth. |
| 1904-5—1905-6 .. .. | G. E. J. CRALLAN, ESQ., M.A., M.B., M.R.C.S. |
| 1906-7 .. .. .. | H. J. WADDINGTON, ESQ., F.L.S. |
| 1907-8—1908-9 .. .. | DR. A. RANSOME, F.R.S. |
| 1909-10 .. .. .. | DR. A. SMITH-WOODWARD, LL.D., F.R.S., F.L.S., F.G.S. |
| 1910-11 .. .. .. | DR. DUKINFIELD H. SCOTT, M.A., LL.D., F.R.S., F.G.S. |

# Annual Meeting, 1910.

THE ANNUAL MEETING for 1910 was held in the Trinity Hall, Lorne Park, Bournemouth, on Saturday, October 29th, at 4.30 p.m. The chair was taken by Dr. Ord.

The minutes of the last Annual Meeting, held on the 30th October, 1909, were read by Dr. Dixon and confirmed.

The Committee's Report for the past year was read and adopted.

The Hon. Treasurer read his Statement of Accounts and Balance Sheet, showing a balance in hand of £68 11s. 8d. The Balance Sheet was accepted and a vote of thanks was passed to the Hon. Treasurer, Mr. Brumell.

The Reports of the Chairmen of Sections were read. Details of these appear in the 2nd vol. of "Proceedings."

Dr. Dukinfield H. Scott, M.A., LL.D., F.R.S., F.G.S., President of the Linnean Society, was proposed as the President of the Society for the ensuing year and was elected unanimously.

Four vacancies in the Committee of the past year were filled up by Sir Daniel Morris, K.C.M.G., M.A., F.L.S., Mr. G. M. French, Mr. F. I. Cooke, and Mr. T. Michell; in place of Mr. Parkinson Curtis and Mr. G. M. Stubbs retiring. Mr. H. Le Jeune was appointed Hon. Sec. and Mr. Wells to joint Chairmanship of the Microscopical and Zoological Section. Mr. Liddiard resigned the Chair of the Geographical Section and was succeeded by Mr. A. Scott, B.A.

The rest of the Officers and Committee were re-elected as for the past year.

Rule 13 was altered to read "The Officers of the Society shall consist of . . . . . an Hon. Treasurer, an Hon. Librarian, an Hon. Secretary and one or more Assistant Secretaries." The word "Honorary" to be deleted wherever it occurs qualifying "Secretaries" (plural).

Rule 14 was altered, the word "Council" being substituted for the word "Committee," and wherever the word "Committee" occurs throughout the Rules. And the last sentence but one, commencing "The Chairman shall," etc., was altered to "The Council shall have power to appoint Committees to deal with any business that may be delegated to them."

Dr. Crallan, on behalf of a large number of members of the Society, presented to Dr. Dixon a Cambridge Scientific Rocking Microtome and a cheque for £18 5s., as a testimonial to his services as Hon. Secretary for the last six years. Dr. Dixon thanked the Society for the testimonial and their kindness.

# Summary of Cash Account for year ending 30th September, 1911.

## RECEIPTS.

| | £ | s. | d. |
|---|---|---|---|
| By balance in Bank ... ... ... | 68 | 11 | 8 |
| ,, Members' Subscriptions ... ... | 119 | 12 | 6 |
| ,, ,, ,, for 1912 ... ... | 2 | 12 | 6 |
| ,, Receipts from Lectures (gross) ... | 40 | 10 | 0 |
| ,, Sale of "Proceedings" ... ... | 1 | 12 | 0 |
| ,, Surplus from Excursions ... ... | 1 | 19 | 3 |
| ,, Refund from Students' Association ... | 2 | 16 | 9 |
| ,, Sundries ... ... ... | 1 | 5 | 9 |
| | £239 | 0 | 5 |

G. BRUMELL,
*Hon. Treasurer.*

## PAYMENTS.

| | £ | s. | d. |
|---|---|---|---|
| Rent of Granville Chambers ... ... | 24 | 5 | 0 |
| Hire of Trinity Hall ... ... .. | 6 | 17 | 6 |
| ,, St. Peter's Hall ... ... | 3 | 3 | 0 |
| Assistant Secretary's Salary ... ... | 11 | 0 | 0 |
| Caretaker's Wages ... ... ... | 2 | 14 | 0 |
| 2nd vol. of "Proceedings" .. ... | 26 | 13 | 2 |
| Printing, Stationery and Advertising ... | 21 | 8 | 4 |
| Furniture and Apparatus ... ... | 16 | 1 | 10 |
| Books ... ... ... ... | 1 | 4 | 0 |
| Oxygen ... ... ... ... | 1 | 12 | 8 |
| Lecture Fees and Expenses (excluding Printing and Hire) ... ... ... | 22 | 14 | 2 |
| Postage ... ... ... ... | 14 | 5 | 10 |
| Subscriptions to other Societies ... ... | 2 | 1 | 0 |
| Insurance ... ... ... ... | | 7 | 6 |
| Paid out for Students' Association ... | 2 | 16 | 9 |
| Sundries ... ... ... ... | 6 | 7 | 6 |
| | £163 | 12 | 3 |
| Balance at Bank ... | 75 | 8 | 2 |
| | £239 | 0 | 5 |

I have examined the foregoing Account with the Vouchers for Receipts and Payments and have found the same correct.

*27th October, 1911.*

EDWARD BICKER, *Auditor.*

# Council's Report
## for the year ending Sept. 30th, 1911.

THE Council's Report for the last year is a very satisfactory one. The following is a summary of the whole, the details of which will be dealt with more fully by the Chairmen of Sections and Officers' Reports.

Since the last Annual General Meeting on the 29th October last year, there have been:—

10 General Lectures,
40 Sectional Lectures and indoor Meetings,
6 General Excursions,
22 Sectional Excursions,

making a total of 78 meetings altogether, as compared with the total of 67 meetings in the previous year. The General Lectures were as follows:—

1910.

Nov. 12th.—"Corfe Castle and the Royal Isle of Purbeck," by Mr. Harry Pouncy.

Dec. 17th.—"An Address introductory to the Study of Geology," by Dr. W. T. Ord.

1911.

Jan. 14th.—"Telescopes—their History and Construction," by Mr. E. W. Barlow.

Jan. 28th.—"Highways and Byeways in Belgium," by Mr. C. J. Hankinson, J.P.

Feb. 18th.—"Roses—their Growth and Culture," by Mr. J. B. Stevenson.

Feb. 25th—"Recent Discoveries in Tropical Diseases," by Dr. Sandwith, F.R.C.P.

March 11th—"My experiences and impressions of life amongst the Japanese," by Dr. S. McCalmont Hill.

April 1st — "Jerusalem, Jericho and Bethlehem," by Canon Cooke Yarborough, Vicar of Christchurch.

April 29th.—"Mediæval Costume, as illustrated by the Monuments in Wimborne Minster," by Miss Ida M. Roper, F.L.S.

May 6th.—An Exhibition of Micro-Cinematography," by Mr Geo. G. Hamilton.

All were illustrated by Lantern Slides.

The General Excursions were:—

May 17th.—The Tarrant Valley, conducted by Mr. G. Galpin.

June 14th.—The New Forest and Cuffnells, conducted by Sir Daniel Morris, K.C.M.G., and Mr. Geo. Brownen.

July 19th.—Salisbury and Old Sarum, conducted by Col. Hawley, F.S.A., Messrs. H. Hammond and H. B. Wells.

Aug. 9th.—Portland, conducted by Mr. F. J. Barnes.

Sept. 13th.—East Lulworth and Wareham, conducted by Dr. W. T. Ord.

Oct. 4th.—Breamore and Downton, conducted by Mr. J. M. French.

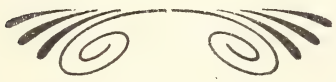
The details of the Sectional Lectures and Excursions will be given in the Sectional Reports.

The Society is to be congratulated on having obtained the consent of Sir E. Ray Lankester to be nominated for election as President for the forthcoming year.

The financial position of the Society is eminently satisfactory, as the Hon. Treasurer's Report will disclose, and the thanks of the Society are especially due to Mr. Brumell for his ever increasing labours in that post.

Several valuable gifts in books and specimens have been made to the Society, which will probably be enumerated by the Hon. Librarian's and Sectional Reports.

The Council desire to express their thanks to those members and friends who have contributed lectures or conducted excursions during the past year.



# Hon. Librarian's Report for 1910-11.

I AM very glad to report that our library has steadily grown during the year. Most welcome donations have been received from Dr. Ransome, of several volumes; from Dr. Ord, of a work on local geology, he being the author; and Dr. Crallan has added still further to his remarkable generosity in starting our library.

Other kind donors are Miss Rooper, Mr. R. V. Sherring, several volumes; Mr. J. M. French, five books; whilst Messrs. Arthur Whitehead, H. Le Jeune, Geo. Ricks, and R. P. Yates are all contributors. To the Rev. C. Robertson Honey, the author, we are indebted for a work on the Egyptian Hieroglyph, which is unique in character, and as only fifty copies of it are published, no doubt it is of considerable value.

May I be allowed to suggest that a very little help of a similar kind from several friends would make our library more thoroughly representative and of still greater value to our Society. May I also hint that perhaps our little library is worthy of somewhat more attention than it has yet received.

The usual interchange of annual reports and proceedings has been made between this Society and kindred ones, and these records may be recommended as of great interest to our members.

Especially is this so in the case of the Chester Society of Natural Science, which has attached to their usual report a short history of their Society, from its foundation, by no less a personage than the late Charles Kingsley, to the present time. To all those—and surely they are many—to whom this great name is an inspiring memory, I beg to commend this little sketch as of great biographical interest; also it is pregnant with example and suggestion to all Societies like our own.

Many will no doubt have seen an account of the opening by Lord Rosebery, in his own inimitable way, of the Mitchell Library at Glasgow, when with a courage all his own he confessed to no small depression in the presence of some 180,000 volumes—mostly dead. An enormous cemetery of books, as he put it. Others of the books, he suggested, were but half alive, so that he feared the truly live ones were comparatively few in number.

Now I think I may at least relieve the minds of any intending visitors to our very modest nucleus of a library from any apprehension of this kind in regard to it. For practically all our books are more or less scientific in character, and science, as a rule, neglecting theory, marches by sure, well-tested steps to impregnable conclusions. So that the books upon *our* shelves are *not* dead, but are a record, and a living record, of accumulated fact. They are part and parcel of that magnificent and continually more successful effort of modern science to solve the riddles of that marvellous universe in which we live, and to solve them to the ever increasing benefit of all mankind.

# Report of Delegate to British Association.

SIR DANIEL MORRIS reported that as a delegate of the Bournemouth Natural Science Society he attended the Conference of Corresponding Societies at the meeting of the British Association at Portsmouth in August and September last.

On August 31st an address to the delegates was delivered by Professor J. W. Gregory, F.R.S., on "The Scientific Misappropriation of Popular Terms." A copy of the address is deposited in the library for reference.

A paper by Mr. Wilfrid Mark Webb, F.L.S., Secretary of the Selborne Society, was presented on "The Preservation of Rare British Plants," and the co-operation of members of the Corresponding Societies was invited in this direction.

On September 5th a popular lecture on "The Study of British Fungi" was delivered by Professor Harold W. T. Wager, F.R.S., of the Yorkshire College at Leeds. The lecture was illustrated by a remarkably fine collection of coloured drawings of fungi, and followed by an interesting discussion, showing that in some districts fungi were very carefully studied in regard to the distribution of species, as well as in respect of their economic interest and their influence as parasites on the production of agricultural crops.

At the request of the Chairman, Sir Daniel Morris opened a discussion on "The Co-ordination of Local Scientific Societies," suggesting that in districts where two or more separate Natural History Societies existed, each with its own organisation and officers and issuing separate publications, a policy of consolidation would probably result in greater efficiency and economy and in the issue of a really creditable volume of Transactions.

The organisation by sections of the Bournemouth Natural Science Society was referred to, and the advantages presented by such an organisation were described. It was claimed that not only did it secure the co-operation of a larger section of the general community, but by its position and influence it advanced to a much greater degree the claims and progress of science.

The discussion proved a distinctly useful one. A large number of interesting facts were contributed by delegates from all parts as to the working of local scientific societies, and a strong wish was expressed that the subject might be taken up and more fully dealt with at the meeting of the Association in 1912.

# The late Arthur William Thomas, M.D.

We much regret to record the death, on February 28th, 1911, of Dr. A. W. Thomas, at the comparatively early age of 50. Dr. Thomas was the third son of William Thomas, of Somerset House, who, on account of his wide range of knowledge, was familiarly known amongst his friends as "The Walking Encyclopædia."

The eldest son, Llewellyn, had a short but distinguished career as a throat and ear specialist, and was one of the founders of the Central London Throat and Ear Hospital. He died at the age of 36.

The second son, Sidney Gilchrist Thomas, attained world-wide fame as the inventor of the Basic Process for the Dephosphorisation of Iron, in conjunction with his cousin, Percy Gilchrist. This process revolutionised the steel industry of Europe and America, and made it possible to work with profit vast beds of phosphoric iron ore.

In Germany the name "Thomas" is a household word in connection with the "Thomas Pulver," or as it is called in England, "Basic Slag."

Arthur, the third son, was born in 1861, and after being educated at Dulwich College, became a medical student at Charing Cross Hospital. His subsequent degrees included L.S.A. 1882, M.R.C.S Eng. 1884, M.D. Brussels 1889. He was a Member of the British Medical Association, and a Fellow of the British Gynæcological Society, and had held the following appointments:— Acting-Assistant Surgeon, H.M. Prison, Wandsworth; Hon. Surgeon, St. Nicholas' Home for Crippled Children; Medical Ref., Marine and General Insurance Co.; Clinical Assistant, Chelsea Hospital for Women; Surgeon, African S.S. Co.; Assistant Surgeon, H.M. Prison, Nottingham. In 1886 he went into practice at Wandsworth Common, London, and was appointed Consulting Physician to the Bolingbroke Hospital. In 1900 Dr. Thomas removed to Boscombe, and entered into practice there in a quiet way, having come chiefly for rest and change. While there not a few of his old patients used to come to Bournemouth in order that they might be near their medical adviser of former days and their trusted friend.

Of a genial and kindly disposition, and with a fund of quiet humour, Dr. Thomas was deservedly popular and greatly liked and esteemed. He was an ardent student of Nature, and spent much of his time in scientific pursuits in the open air of the country. He took a great interest in the Bournemouth Natural Science Society, and was successively Chairman of the Archæological and Zoological Sections. He was also a Vice-President.

Dr. Thomas in 1889 married Agnes, daughter of Andrew Low, Esq. She predeceased him by three years, and there is no doubt that his health was greatly affected by his sad loss.

The late Dr. A. W. Thomas.

# List of Members.

* Honorary Members. † Past President.

## A

| | |
|---|---|
| Alder, Mrs. | East Grove, Lymington |
| Alder, Miss Evelyn | " " " |
| Aldridge, Mrs. | Denewood, Alum Chine Road |
| Allday, J. L. | Priory Lodge, Alumhurst Road |
| Allday, Mrs. | " " " " |
| Allan, Alex. | Bylands, Boscombe |
| Allen, Rev. F. A., M.A. | Staffa, Wellington Road, Parkstone |
| Allis-Smith, Miss E. | Martello Towers, Branksome Park |
| Allwood, Miss C. A. | The Chimes, Crabton Close Road, Boscombe |
| Anthony, H. | Crossways, Burtley Road, Southbourne |
| Anthony, W. S. | Rosendale, Branksome Wood Road |
| Archer, J. W. | Windlesham, Braidley Road |
| Archer, Mrs. | " " " |
| Aston, J. J. | Habberley, Hamilton Road, Boscombe |
| Atkins, Dr. F. | Cathay, Alumhurst Road |
| Atkins, Mrs. | " " " |
| Atkins, W. | The Hermitage, Wimborne Road |
| Atkins, Mrs. | " " " |
| Atkinson, Miss | Berwyn, Hamilton Road |

## B

| | |
|---|---|
| Backhouse, H. | Yelland, McKinley Road |
| Backhouse, Mrs. | " " |
| Bain, Mrs. | 5, Christchurch Road |
| Bainbridge, Surgeon-General | Eridge, Branksome Wood Road |
| Banks, R. Y. | Egerton, Portchester Road |
| Barlow, E. W., F.R.A.S. | Ditton Lodge, Stourwood |
| Barrett, J. Hayes | The Nook, Dalkeith Steps |
| Bartlett, H. F. D. | 1, Myrtle Road, Richmond Park |
| Batley, Dr. | 8, High Street, Christchurch |
| Bell, T. G., M.D. | Poole Road, Branksome |
| Bell, Miss R. | Clonmarron, Christchurch |
| Bell, Miss Winifred | St. Wulfram's, Frederica Road, Winton |
| Benison, F. | Aldborough House, Rosemount Road |
| Benison, Mrs. | " " |
| Bennett, H. Morden | Manor Lodge, Manor Road |
| Bennett, Miss E. C. | Bonavista, Boscombe Spa Road |
| Bennett, G. | Sigwells, 20, Belle Vue Road, Southbourne |
| Bennett, Mrs. | " " " |
| Bennett, G. | Magdalen College, Oxford |
| Blackett, C. H. | Rosapenna, McKinley Road |
| Blackett, W. E. | Blanchland, McKinley Road |
| Blosse, Rev. R. C. Lynch | Hawthorn Dene, Cavendish Road |
| Blundell, Miss M. J. | Oakley, Carysfort Road, Boscombe |
| *Bond, F. Bligh, F.R.I.B.A. | Glastonbury |
| Boxer, Miss Violet | Firwood, Alum Chine |
| Brazier, J. J. | East Hill, Southcote Road |
| Bridger, Commander N. L., R.N. | Walton Leigh, Tower Road |
| Brown, M. Ralph | Foxton, Landseer Road |

| | |
|---|---|
| Brownen, G., F.C.S. | Talnas, Grove Road, Christchurch |
| Brownen, Mrs. | ,, ,, ,, |
| Brumell, G., A.R.I.B.A. | Maori, Richmond Park Avenue |
| Brumell, Mrs. | ,, ,, ,, |
| Buckler, William | 60, West Cliff Road |
| Buckler, Mrs. | ,, ,, |
| Bulfin, Ignatius, B.A. | The Den, Knole Road |
| Bulfin, Mrs. | ,, ,, |

## C

| | |
|---|---|
| Cameron, Miss | Little Forest House |
| Casswell, Miss W. | 27, Suffolk Road |
| Cavit, C. G. | Marly, Argyll Road, Boscombe |
| Chaffey, W. J. | 294, Wyndham Road |
| Chambers, D. | 41, Seabourne Road, West Southbourne |
| Chandler, S. Whitty, B.A. | St. George's, Cecil Road, Boscombe |
| Chandler, Mrs. Whitty | ,, ,, ,, |
| Chapman, F. F. | Penrhyn, Argyll Road, Boscombe. |
| Chapman, Miss | ,, ,, ,, |
| Chidell, Miss | Nairn, Suffolk Road |
| Chittenden, H. | Kynance, Talbot Road |
| Clark, Walter Child | Michelgrove House, Boscombe |
| Coddington, E. F. | St. Frideswide, Southbourne Road |
| Colclough, J. E. H. | Bellagio, Pembroke Road |
| Coles, Dr. A. C. | York House, Poole Road |
| Compton, Rev. D. G. | The Downs, Clifton Road, Southbourne |
| Cooke, F. I. | Corona, Annerley Road |
| Cooper, Rev. Windle, M.A., F.R.G.S. | Bergen, Branksome Wood Road |
| Cooper, Mrs. J. Omer | Calcot, Westby Road, Boscombe |
| Cooper, J. Omer | ,, ,, ,, |
| Cooper, Wilfred Omer | ,, ,, ,, |
| Cooper-Dean, Mrs. | The Old Vicarage, Pokesdown |
| Cooper-Dean, Miss A. E. | Littledown, Christchurch |
| Cowie, Dr. | Bonaccord, Westminster Road |
| †Crallan, Dr. G. E. J., M.A., M.B., M.R.C.S. | The Elms, Parkstone |
| Crallan, Mrs. | ,, ,, |
| Crespi, Dr. | Wimborne |
| Curtis, W. Parkinson, F.E.S. | The Square |

## D

| | |
|---|---|
| Dacombe, J. M. J. | 27, Holdenhurst Road |
| Davenport, Miss C. | St. Clement's Vicarage |
| de Castro, G., M.R.C.S. | Sunnydene, Drummond Road |
| de Castro, Mrs. | ,, ,, |
| de Paiva, R. A. | San Remo, Carysfort Road |
| de Paiva, Mrs. | ,, ,, |
| Dibben, Miss M. | c/o Mrs. Jeremy |
| *Dixon, Dr. J. R. L. | Torbay House, Torbay Road, Paignton |
| Dodd, Dr. | Maybrook, Wimborne |
| Dodshon, Edwin | Lloyd's Bank Chambers |
| Druitt, J. | Avebury, Madeira Road |
| Druitt, Herbert | 15, High Street, Christchurch |
| Dunning, Mrs. | The Homestead, St. Clement's Road |

## E

| | |
|---|---|
| Earle, Dr. | The Wyke, Brunstead Road |
| Elwes, Capt. G. R., J.P. | Bossington, Knyveton Road |
| Evans, P. | Saugeen, Derby Road |
| Evens, T., M. INST. C.E. | Pobbles, Southwood Avenue, Stourwood |
| Evens, Mrs. | ,, ,, ,, |

## F

| | |
|---|---|
| Fairles, Gustavus W. | Bank House, Alexandra Road, Parkstone |
| Firbank, Miss | Buchanan Avenue |
| Foster, Miss Ada | Hendra, Studland Road |
| Foster, Miss Amy | ,, ,, |
| Fowler, Miss R. M. | Rushcot, St. Winifred's Road |
| Fowler, Miss V. M. | ,, ,, |
| Fraser-Hird, Rev. F., M.A. | Eaglehurst, Parkwood Road |
| Frean, G. M. | Cranicombe, Branksome Avenue |
| Frean, Mrs. | ,, ,, |
| French, J. M. | 12, Wharncliffe Road, Boscombe |
| Frewin, Alfred | Rowherne, Branksome Wood Road |
| Funnell, Miss B. E. | Kelso, Campbell Road, Boscombe |

## G

| | |
|---|---|
| Galpin, G. | Clarendon Court, Clarendon Road |
| Gardiner, Miss | The Rosery, 105, Alumhurst Road |
| Gardner, Dr. W. T. | Netherhall, Poole Road |
| Gardner, W. Temple | Alexandra Road, Parkstone |
| Garrett, T. R. H., M.A., F.G.S., F.R.G.S. | c/o Algemeene Exploratie Maatschappij, Palembang, Sumatra |
| Ghey, Mrs. | Berwyn, Richmond Park Avenue |
| Gissing, Admiral C. E. | Homestead, Queen's Park, South Drive |
| Goodall, T. B., F.R.C.V.S., F.L.S. | Purewell Cross, Christchurch |
| Graham, F. A. | 21, Beaulieu Road, Bournemouth |
| Grange, Dr. W. D'Oyly | 11, McKinley Road |
| Gray, A. | Woodville, Melville Road, Winton |
| Gray, G. W. | Darena, Wellington Road |
| Gray, Mrs. | ,, ,, |
| Green, Rev. E. P., M.A. | Glen Fern, Carysfort Road |
| Grindley, Miss E. J. | Chatfield, Parkstone |
| Guest, G. | St. Paul's School |
| Guy, Miss | St. Paul's School |

## H

| | |
|---|---|
| Hamilton, G. G., F.R.C.S. | Boscombe Place, Boscombe |
| Hamilton, Mrs. | ,, ,, |
| Hamilton, Major Claude | Westholme, Foxholes Road, Southbourne |
| Handley, Rev. S. B. | Copthorne, Winton |
| Hankinson, C. J., J.P. | Eastbury, Surrey Road |
| Harding, Miss | Alma Road Council School |
| Hawker, Miss | Kingsbere, Meyrick Park Crescent |
| Hayllar, J., J.P. | Redholme, Cambridge Road |
| Hayllar, Miss | ,, ,, |
| Haylock, Dr. S. J. | Balsham, Clifton Road, Southbourne |
| Heaton, Guy, M.A. | St. David's, West Cliff Road |
| Hennesey, J. E., B.Sc. | Guildhill Road, Southbourne |
| Henslow, Rev. Professor G., M.A., F.L.S., F.G.S. | Denehurst Branksome Wood Road |

| | |
|---|---|
| Heywood, Col. J. M. | Sutherland Hall, South Cliff |
| Hill, S. McCalmont, D.C.L. | The Priory, Argyll Road, Boscombe |
| Hinton, Miss | Welcombe, Argyll Road, Boscombe |
| Hollins, J. C. | Mitford, Pembroke Road |
| Holmes, C. F. | Brackenwood, Southern Road, West Southbourne |
| Holmes, Mrs. | ,, ,, ,, |
| Holmes, Miss M. A. | Oldmead, Herberton Road |
| Holmes, Miss S. C. M. | ,, ,, |
| Hughes, D. | Meran, Wellington Road |
| Haylock, Dr. S. J. | Balsham, Clifton Road, Southbourne |

## I

| | |
|---|---|
| Ibbett, F. W. | Central Education Office, Yelverton Road |

## J

| | |
|---|---|
| Jackson-Smith, Rev. T. | Hollingbury, Calthorpe Road |
| Jeffery, T. J. P. | Meldon, Ormonde Road |
| Jennings, Miss C. E. | Edenhurst, Sandbanks Road, Parkstone |
| Jeremy, Mrs. | Whalley Range, Portarlington Road |
| Jeremy, Dr. Mary | 4, Richmond Hill |
| Jermyn, F. L. | Danny Corner, Stirling Road |
| Jones, W. | 254, Old Christchurch Road |
| Jones, W. | Council School, Boscombe |

## K

| | |
|---|---|
| Kay, A. J. | Amesbury, 26, Princess Road |
| Kaye, J. E. | Tynedale, Portchester Road |
| Kaye, W. J. | Birk House, Wollstonecraft Road |
| Killick, Miss T. L. B. | c/o Dr. Crallan |

## L

| | |
|---|---|
| Langley-Smith, W. | Alumhurst Tower, Alumhurst Road |
| Langley-Smith, Miss | ,, ,, |
| Langley-Smith, Miss R. | ,, ,, |
| Lattey, F. | Alyngby, Stourcliffe Avenue, Stourwood |
| Le Jeune, H. | St. Ives, Ashley Road, Parkstone |
| Lendrum, Miss A. M. | c/o Mr. de Paiva |
| *Liddiard, J. E., F.R.G.S., M.N.G.S. | Rodborough Grange, West Cliff Road |
| Lilley, W. | St. Agatha's, Owl's Road, Boscombe |
| Lilley, Mrs. | ,, ,, ,, |
| *Linton, Rev. E. F., M.A. | Edmondsham, Salisbury |
| Lucas, Arthur | Croftmoor, Dean Park Road |
| Lucas, Arthur, Junr. | Highfield, Richmond Park Avenue |
| Lupton, Miss | Bollingbroke, Knole Road |
| Lyon, C. | Shalimar, Wilderton Road, Branksome Park |
| Lyon, Mrs. | ,, ,, ,, |

## M

| | |
|---|---|
| MacAlister, R., M. INST. C.E. | Somerled, Meyrick Park Crescent |
| MacAlister, Mrs. | ,, ,, ,, |
| Mackay, Miss | St. Andrew's School, Malmesbury Park |
| Mann, W. P., B.A. | 38, Crabton Close Road, Boscombe |

| | |
|---|---|
| Marks, Miss H. | Bourne Hall Hotel |
| *Markwick, Col. E. E., C.B., F.R.A.S. | c/o Sir C. R. McGrigor, Bart., and Co., 25, Charles Street, St. James Sq., S.W. |
| March, H. Colley, M.D., F.S.A., M.R.S.A.I., F.A.I. | Nethergrove, Portesham, Dorchester |
| Martland, Dr. T. | Standish House, Fitzharris Avenue |
| Mate, Ald. C. H. | Elim, Surrey Road |
| Maude, W. C. | Brackenwood, Gervis Road |
| McBean, Miss S. | Froebelheim School, Lowther Road |
| Mercer, Dr. W. B. | Ryburn, Southbourne, Christchurch. |
| Michell, T. | Trewirgie, Wellington Road |
| Michell, Mrs. | ,, ,, |
| Miller, Joseph, L.D.S.R.C.S. EDIN. | Wenonah, Poole Road |
| Miller, Mrs. | ,, ,, |
| Montgomery, Miss L.F.M. | Everton, 49, Westby Road, Boscombe |
| Moon, P. G. G., F.C.S. | Hill Croft, Alexandra Road, Parkstone |
| Moorhead, Dr. | Imperial Hotel |
| *Morris, Sir Daniel, K.C.M.G., M.A., F.L.S. | 14, Crabton Close Road, Boscombe |
| Morris, Lady | ,, ,, |
| Moss, Miss | The Grange, Westby Road, Boscombe |

## N

| | |
|---|---|
| Neale, J., B.A. | 36, Beaufort Road |
| Neale, Mrs. | ,, ,, |
| Neale, Miss D. | ,, ,, |
| Neve, Miss | Merridale, Westby Road, Boscombe |
| Nicholson, Mrs. | Ashfield, St. Clement's Road |
| Nunn, Dr. | Gestingthorpe, 3, Hayes Avenue |

## O

| | |
|---|---|
| Oke, A. W., B.A., LL.M., F.G.S. F.S.A. | 32, Denmark Villas, Hove, Brighton |
| Oliver, C. R. | Ambleside, Parkwood Road, Boscombe |
| Oliver, Mrs | ,, ,, ,, |
| Ord, Dr. W. T., F.G.S. | Greensted, Madeira Road |
| Ord, Mrs. | ,, ,, |
| Ord, Miss | ,, ,, |

## P

| | |
|---|---|
| Page, T. | Trevissome, Parkstone Road, Poole |
| Page, Mrs. | ,, ,, ,, |
| Page, Miss P. | ,, ,, ,, |
| Painter, Hubert, B.SC., F.C.S. | 29, Talbot Road, Winton |
| Painter, Mrs. | ,, ,, |
| Parish, Miss | Bentley Lodge, Hengist Road |
| Parmiter, P. J. | Milton House, St. Leonard's Road |
| Parmiter, C. J. | ,, ,, |
| Parmiter, Mrs. | ,, ,, |
| Pate, Rev. J. | Spencer House, Constitution Hill, Parkstone |
| Pechell, Sir A. Brooke, Bart. | Hilfield, 26, Bath Road |
| Pechell, Miss | ,, ,, |
| Phillips, Mrs. | 42, Alumhurst Road |
| Povah, Edwin | 112, Parkwood Road, Boscombe |
| Preston, Donald W. | Bank Chambers, Yelverton Road |
| Pritchard, Miss M. E. | Eildon, Langdon Road, Parkstone |
| Pullman, J. | The Knollsea, Lilliput, Parkstone |
| Pullman, A. | Seacroft, Cliff Drive, Southbourne |
| Pyemont, Miss Rosa U. | 32, Hawkwood Road, Boscombe |

## Q

| | |
|---|---|
| Quilliam, Miss E. | Stratton, West Cliff Road |

## R

| | |
|---|---|
| †Ransome, Dr. A., F.R.S. | Sunnyhurst, Dean Park Road |
| Ransome, Miss | ,, ,, |
| *Rayner, J. F. | Ivy Bank, Highfield, Southampton |
| Robertson, Mrs. | Wrenwood, Westbourne Park Road |
| *Rogers, Rev. Moyle | Chetnole, Grosvenor Road |
| Rogers-Barns, Miss | Bevois Cottage, King's Park Road |
| Rooper, Miss C. Agnes | Pen Selwood, Gervis Road |
| Ross, Col. W. H. | Ambleside, Dean Park Road |
| Rudkin, Miss F. | Ivel Cottage, Hamilton Road, Boscombe |
| Rutherford, C. R. | South Dene, Groveley Road |
| Rutter, G. H., M.B. | Roxbury House, Poole Road |
| Rutter, Mrs. | ,, ,, |
| Ryde, Kenneth A. | 45, St. Swithin's Road |

## S

| | |
|---|---|
| St. Barbe, H. | Vicars Hill, Lymington |
| St. Leger, Colonel | Christchurch Lodge, Rosemount Road |
| Saunders, Hugh A., B.A., F.R.G.S. | Brookfield House, Swanage |
| Scattergood, J. | Alma Road Council School |
| Scott, J. H., M.E., M.I.M.C.E. | Skiddaw, Talbot Hill, Winton |
| Scott, W. H., M.A. | Hendall, Westminster Road |
| Sedgfield, Miss C. B. | Hartmoor, Alumdale Road |
| Sherring, R. V., F.L.S. | Kildare, Norwich Avenue |
| Sherring, Miss | ,, ,, |
| Shuttleworth, Miss M. A. | 27, Suffolk Road |
| Smith, Francis F. | 5, Castlemain Road |
| Smith, Rev. H. Philip | Spinney Hall, Grosvenor Gardens, Boscombe |
| Southby, Miss E. H. | Twyford Lodge, Cavendish Road |
| Spencer, J. F. | Glenthorne, Richmond Park Road |
| Spriggs, A. T. | The Bryn, Belle Vue Road, Southbourne |
| Spriggs, Mrs. | ,, ,, ,, |
| Stevenson, E. A. | Northwood, Windermere Road |
| Stevenson, Col. W. F., C.B. | Drimna, Portchester Road |
| Stock, W. H. | Pine Tower, Talbot Road, Winton |
| Stokes, R. | Laverstock, Cliff Road, Boscombe |
| Sulivan, Gerald H., B.SC. | The Old Ride, Branksome Park |
| Sutton, H. | Ravenshall, Chine Crescent Road |
| Sutton, Mrs. | ,, ,, |
| Sutton, K. H. M. | ,, ,, |
| Sutton, Miss C. E. M. | ,, ,, |
| Swallow, E. | Westridge, Sandbanks, Parkstone |
| Swain, H. E. | Sorrento, Studland Road |
| Swain, Mrs. | ,, ,, |
| Sworn, Mrs. | Normandale, Lansdowne Road |

## T

| | |
|---|---|
| Tallant, Miss A. | Gablehurst, Kingsbridge Road, Parkstone |
| Thompson, Rev. G., M.A. | Highbury, Bodorgan Road |
| Thompson, C. R. | Holmwood, Castle Hill, Parkstone |
| Thompson, Miss Alice | ,, ,, ,, |
| Thompson, Miss A. C. | ,, ,, ,, |
| Thompson, Miss Ellen | ,, ,, |

| | |
|---|---|
| Thomson, Dr. J. Roberts, J.P. | Monkchester, Manor Road |
| Thomson, Matthew | Fircliff, Studland Road |
| Tickell, Miss S. M. | Richmond House, Campbell Road, Boscombe |
| Towle, Rev. W. Harrison | Collett House, Drummond Road |
| Towsey, Miss E. L. | Moseley, Owls Road, Boscombe |
| Tyler, Miss E. V. | Caldicott, Alexandra Road, Parkstone |
| Tyler, Miss G. | ,, ,, ,, |

## V

| | |
|---|---|
| Vernon, Dr. A. H. | 1, The Crescent, Boscombe |
| Veale, Miss L. H. | Pengelly House, Beaulieu Road |
| Vipan, Miss Dora | St. Michael's Vicarage |

## W

| | |
|---|---|
| †Waddington, H. J., F.L.S. | Moreton, Lowther Road |
| *Wallace, Dr. Alfred Russel, O.M. | Broadstone, Dorset |
| Waldron, Miss | Benvenuto, Portarlington Road |
| Waldron, Miss F. | ,, ,, |
| Warburton, Dr. | Satara, Chester Road |
| Warburton, Mrs. | ,, ,, |
| Warr, Miss Ada | Cottesmore, Pokesdown Hill |
| Waters, A. W., F.L.S., F.G.S. | Alderley, McKinley Road |
| Waters, Mrs. | ,, ,, |
| Watson, J. J. | Golftyn, Parkstone Avenue, Parkstone |
| Webster, Rev. T. | Devonia, Chatsworth Road |
| Welby, Rev. A. | Englefield, Groveley Road |
| Wells, H. B. | Stalham, Studland Road |
| Wells, Mrs. F. | ,, ,, |
| Williams, Rev. Richard | Kingsworthy, Southbourne |
| Wolfe, A. | Richmond Hill Printing Works |
| Wood, Samuel, F.C.A., M. INST. G.E. | Beverley, Grand Avenue, West Southbourne |
| Woodhouse, W. J., A.C.P. | 35, Chatsworth Road |
| Woollacott, J. C. | Solent View, Belle Vue Road, Southbourne |
| Wright, Rev. T. Russell | Mountside, Westbourne Park Road |

## Y

| | |
|---|---|
| Yates, R. P. | Wood Manton, Wellington Road |
| Yates, Mrs. | ,, ,, |
| Yates, Miss I. | ,, ,, |
| Yates, T. A. | ,, ,, |

# RULES OF THE

# Bournemouth Natural Science Society.

*Amended to February 5th, 1912.*

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Title

1.—The title of the Society shall be THE BOURNEMOUTH NATURAL SCIENCE SOCIETY.

Objects

2.—The objects of the Society shall be the promotion of the study of Science in all its branches, by means of Lectures, Field Meetings, the Reading and Discussion of Papers, and the formation of Sections of its members devoted to any particular branch of the Society's work, or by any other means that the governing body of the Society shall deem advisable.

3.—The Society shall encourage the making of reports on any plant animal, or object of interest, and where the Society may deem it necessary, shall take such steps as may be advisable to secure any such plant, animal, or object of interest from injury, extinction or destruction.

Members

4.—The Society shall consist of Ordinary, Life, Associate, and Honorary Members.

Council

5.—There shall be a Council of the Society consisting of the Hon. Treasurer, Hon. Secretary, Hon. Assistant Secretary, Assistant Secretary, the Vice-Presidents who have filled the office of President, the Hon. Librarian, the Chairmen of Sections and eight elected Members.

The Council shall have the general management of the Society. At all Meetings of the Council, five shall form a Quorum. The Council shall elect their own Chairman and Deputy Chairman for the Year, and shall have power to fill up any vacancies in their number which may occur from time to time. The Council shall have power to appoint Committees to deal with any business that may be delegated to them.

The Chairman, or in his absence the Deputy Chairman, at all Meetings of the Council shall have an original and a casting vote.

The Council shall have the control of the Funds of the Society.

Executive Officers

6.—The Executive Officers of the Society shall consist of the Chairman and Deputy Chairman of Council, Hon. Treasurer, Hon. Secretary and one or more Assistant Secretaries.

7.—The Ordinary, Life, and Associate Members of the Society shall be proposed by an existing Member, and seconded by another existing Member, and notice shall be sent to one of the Secretaries of the Society of the names and address of the nominee, and the names of the proposer and seconder. Any such proposed new Member shall be voted for at the next ensuing Council Meeting, and if two-thirds of the Council present and voting shall vote for the proposed new member, such candidate shall become a Member upon payment of the Annual Subscription, and shall receive a card of membership (not transferable) entitling him or her to attend the Meetings of the Society. Members joining during August and September shall be given a card of membership to September 30th of the following year.

Ordinary Members

8.—Ordinary Members shall pay an Annual Subscription of Ten Shillings, due on the first day of October in each Year. The Annual Subscription for Adult Members of the same family, not exceeding four and residing in the same house, shall be Twenty Shillings, each Member being elected in the usual manner and each receiving a card of membership.

9.—The Subscription for Life Members shall be Five Guineas. Any Ordinary Member who shall have commuted his Subscription, as provided for in this Rule, shall become a Life Member, but shall not by reason thereof have any different rights from those of an Ordinary Member. Life Members

10.—Associate Members are those who by payment of an Annual Subscription of Two Shillings and Sixpence are entitled to attend all the General Meetings and Excursions of the Society. They also have the privilege of attending the Meetings and Excursions of one particular Section they may select at the time of their Election, or at the commencement of each Session, their choice being notified by them to the Hon. Treasurer. The following are entitled to become Associate Members on Election by the Council. Associate Members

(a) Teachers in schools who are still engaged in the active duties of their profession.

(b) Persons who in the opinion of the Council although unable to pay the fee for full membership, are by their acknowledged scientific tastes or attainments, likely to prove useful working Members of the Society.

On further payment of Two Shillings and Sixpence Associate Members are admitted to the Meetings and Excursions of all the Sections.

Associate Members shall have no power of voting on the affairs of the Society, or of holding office.

11.—Any person who is either distinguished in Science or has rendered any special service to the Society, may be elected an Hon. Member. Such Hon. Members shall be proposed and elected in the same way as Ordinary Members. Honorary Members

12.—Any Visitors introduced by a Member or producing a Member's card, may be admitted to any Meeting or Excursion of the Society on entering their names and that of the introducing Member in the Society's Visitors' Book. Such privilege not to be granted more than twice to any one person in each Session. Visitors

On the recommendation of the Council or Committee authorised by it, Visitors to Bournemouth desirous of attending the Meetings or Excursions of the Society, may obtain a ticket of admission for the Winter or the Summer Meetings or Excursions at a charge of Seven Shillings and Sixpence. Application to be made to the Hon. Secretary for submission to the Council or Committee authorised by it.

13.—Any Members whose subscriptions are unpaid at the end of the financial year (September 30th), on notice to that effect in writing having been given to them by the Hon. Treasurer, shall be reported to the Council, who shall have the power of removing their names from the list of Members.

14.—Resignations should be in writing, and addressed to one of the Hon. Secretaries, and until such are received by them, Members remain liable for their subscriptions.

15.—The power of expulsion of a Member from the Society for objectionable conduct shall be vested in a General Meeting of the Society, provided the Council has caused special notice to be given on the circular convening the Meeting, and that two-thirds of those present and voting agree thereto.

16.—The Council shall arrange all Lectures, Papers, Demonstrations and Exhibitions of Specimens, etc., both for the General and Sectional Meetings of the Society, and shall decide upon all General and Sectional Excursions.

17.—The Council shall have power to form any Section or Sub-Section, to consist of not less than six Members, for the study of any special subject which the Council may deem within the scope of the Society's work. They shall annually appoint the Chairman of any such Section or Sub-Section on the nomination of that Section or Sub-section. Sections

Sectional Meetings

A Section shall consist of those Members who attend in each year not less than three Meetings of such Section.

The Chairman of each Section shall appoint a Secretary, who in addition to the ordinary secretarial duties shall keep a list of the Members of the Section.

18.—Each Sectional Chairman shall be responsible for the preparation and arrangement of each Sectional Meeting and Excursion, and shall submit details of the same to the Hon. Secretary for submission to the next ensuing Meeting of the Council. He shall submit accounts of costs incurred by him to the Hon. Treasurer, after each Meeting or Excursion, who shall lay the same before the Council at their next ensuing Meeting. At the first Meeting of each Section or Sub-section in the Year, after the annual Meeting, such Section or Sub-section shall nominate its Chairman.

19.—A book for each Section shall be provided by the Secretaries to be kept at the Society's Room; each Chairman of Section, or his Secretary shall enter therein an account of each Meeting, with number of Members attending, and notes of any matters of interest observed or discussed. Such book to be presented at each Meeting of the Council. Every Chairman of Section shall report as to the work of his Section at the Annual Meeting of the Society.

20.—Any Members of the Council other than Ex-officio Members who shall have failed to attend half the Meetings of the Council held in any one year, provided that such non-attendance be not caused by illness or absence abroad, shall not be eligible for re-election, except by desire of the Members present at the Annual Meeting.

The President

21.—The President need not necessarily be selected from Members of the Society, and shall be elected annually. He shall deliver an Address at as early a date in the Winter Session as can be arranged.

Vice-Presidents

22.—Any Member of the Society who, in the opinion of the Council, shall have rendered distinguished service to Science or to the Society, shall be eligible for election as a Vice-President at the Annual Meeting, as long as he or she remains a Member of the Society.

23.—Each of the Vice-Presidents in rotation shall be requested to act as Chairman at the General Meetings of the Society.

Secretaries

24.—The Secretaries shall perform all the usual secretarial work; shall keep minutes of all Council Meetings, and the Annual Meeting, and a synopsis of all General Meetings. They shall cause a programme of each General Meeting to be sent to every Member seven days at least before each such Meeting. They shall make all preparations for carrying out all General Meetings and General Excursions, at which they shall receive from each Member his or her share of the day's expenses, and therefrom defray all costs of the Meeting. Any surplus of such collection shall go to the General Fund, and any deficit be defrayed out of that fund. They shall keep an account of all out-of-pocket expenses incurred in arranging Meetings and otherwise. They shall give notice of their election to all new Members. They shall furnish a copy of the Annual Report to all Members who have paid their subscription, to Honorary Members, and to any such Scientific Societies as the Council may from time to time appoint to receive them.

Treasurer

25.—The Honorary Treasurer shall have the custody of the General Funds of the Society. He shall prepare a Financial Statement at the end of each Financial Year to be presented to the Council at the Meeting next preceding the Annual Meeting. He shall receive and acknowledge all Subscriptions, and shall issue tickets of Membership to all persons who are duly elected and have paid their Subscriptions. He shall bring before the Council any accounts that are due for payment. After presentation of the Balance Sheet to the Council, he shall submit it to the Auditors and lastly to the Annual Meeting of the Society.

26.—At the Annual Meeting and at all General Meetings of the Society, not less than ten Members shall form a quorum.

27.—At the Annual Meeting, which shall be held in the month of October, the President, the Executive Officers (except the Chairman and Deputy Chairman of Council), the Hon. Librarian, eight Members of Council and two Auditors for the ensuing year shall be elected (either Auditor having the power to audit the accounts in the unavoidable absence of the other). At this Meeting the Council's Report of the past year, together with those of the Chairmen of Sections, and the Hon. Treasurer's statement of accounts, duly signed by the Auditors, shall be submitted. Annual Meeting

28.—Alterations in the Rules shall be sanctioned by a majority of not less than two-thirds of the Members present and voting at the Annual Meeting, or at a Special Meeting called for that purpose, and no alterations shall otherwise be made.

29.—Notice convening an Annual or Special Meeting, together with any proposed alterations in the Rules, shall be given to Members at least seven clear days before such Meeting be held. Notice of General Meetings, and Council Meetings (if possible) shall be given at least seven clear days beforehand.

30.—On a written requisition, signed by at least five Members of the Society, the Council shall call a Special Meeting to consider any question as to the affairs of the Society; such Meeting to be called within three weeks of the receipt of the requisition, and at least seven days' notice shall be given to the Members. At such Meeting no other business than that mentioned on the requisition, and on the notice convening such Meeting, shall be considered.

# Presidential Address.

## The Seed-Plants of the Coal

By Dr. Dukinfield H. Scott, M.A., LL.D., F.R.S., F.G.S.,
President of the Linnean Society.

*Delivered 26th November, 1910.*

THE Bournemouth coast is famous for its fossil plants. I understand that one of the most interesting of them, a British palm, was described a few days ago by my friend, Sir Daniel Morris, before the Geological Section of this Society, and compared with a nearly allied species still living in India.

It is much to be desired that the rich flora of these Tertiary beds should be more fully investigated. Undoubtedly this will lead to results of no less scientific interest than the work already done on the older vegetation, to which my remarks this afternoon will refer.

The seed-plants of which I am about to speak were separated by an immense interval of time from the palms and dicotyledons of the Eocene flora—we go back at once to the Palæozoic rocks.

Although in those remote ages there were seed-plants in abundance, there were no flowers, at least in the sense in which we commonly and naturally use the word. Seed-plants and flowering plants are by no means the same thing; the seed had been evolved for ages before the flower was arrived at. The flower, with its characteristic bright colours and in many cases its sweet scent, is essentially an organ adapted to cross-fertilization by insect agency. There were insects enough even in the Coal period, but the great dragon-flies and cockroaches of those days were not of the kind to which our flower-visitors belong. It is possible that they may have played some part in the conveyance of pollen even then, for a casual relation between plants and insects may well have existed long before they became mutually adapted to each other's needs.

True flowering plants came in with a rush (at least so it seems to us, though their evolution could not really have been sudden) late in the Mesozoic period. At the time when the Cretaceous rocks were being laid down, the whole face of the world was changed, and everywhere flowers of types familiar to us sprang up. This was the greatest revolution which the vegetable kingdom had ever experienced—almost comparable to the advent of man in the kingdom of animals. The victory of the flowering plants was only made possible by their alliance with the highest forms of insect life, which came in at about the same period.

We are concerned to-day with a far earlier stage in evolution, at a time when the vegetation of the Coal forests, for example, was of

types on the whole strange and unfamiliar. The plants of those days do not readily admit of comparison with the better known families of the present-day flora. During what follows I shall have to make constant reference to a small group of living plants, the Cycadaceæ, or "Cycads," for short, which in many respects stand the nearest to the early seed-plants and give the best clue to their interpretation. As this family may not be familiar to all my hearers, it will be worth while to give a short sketch of this group, so as to render the allied fossil forms more intelligible. One or two Cycads are met with not uncommonly in cultivation; thanks to the kindness of Dr. Ord and Mr. Sherring, I have on the platform a beautiful living example of *Cycas revoluta*, which may well serve as a type.

Those who wish to extend their knowledge of the family have only to go to Kew, where a magnificent collection of these plants forms one of the glories of the Royal Gardens.

The Cycads are widely distributed in the tropical and sub-tropical regions of both the Old and New Worlds, though seldom abundant. There are nine genera: one, the type-genus, *Cycas*, is common to Asia and Australia; two, *Macrozamia* and *Bowenia*, are Australian; two, *Stangeria* and *Encephalartos*, South African; while four, *Zamia*, *Ceratozamia*, *Dioon*, and *Microcycas*, are American, the last-named being peculiar, so far as we know, to the Island of Cuba. This Cycad is inappropriately named, for the American botanist, Caldwell, who has re-discovered the plant on its native hills, finds it to be a tree 30 feet high, with female cones a yard long. A few species of *Cycas* are said to grow still taller, but most Cycads have comparatively short, though often massive and long-lived stems. Some of the South African specimens in the palm house at Kew are more than a hundred years old.

The ordinary form of leaf is pinnate, bearing a deceptive resemblance to many leaves of palms, with which the family has nothing to do. Sometimes quite peculiar forms of leaf are met with, as in a *Cycas* discovered a few years ago in Assam, in which the scattered leaflets are repeatedly forked. The African *Stangeria* has foliage so like that of a fern that it was actually described by competent botanists as a fern, until the cones appeared and showed its true nature. This is a really interesting resemblance, because it points to a relationship, as the fossil evidence shows. In some Cycads the way the leaves or leaflets are coiled in the bud is another fern-like character.

In recent Cycads the sexes are always distinct, and the male plants always bear their fructification in the form of cones, often of very large size. Each scale of the cone is a stamen, but very unlike the stamen of a flowering plant. The under-side of the scale is covered with a multitude of pollen-sacs, like the sporangia on the frond of a fern.

In eight out of the nine genera the female fructification is also a cone, resembling the male in external appearance, but more robust. Each scale bears on its margin two ovules, sometimes brightly coloured, which may grow as large as a plum, even though

unfertilised. *Cycas* itself differs from all other living seed-plants in the fact that the female plant forms nothing of the nature of a flower or cone; the carpels are large, leaf-like structures borne directly on the main stem like the ordinary leaves. The number of seeds on each carpel is often as many as six. The ripe seeds may be of the size of a peach; in *Cycas revoluta* the strange fructification is extremely conspicuous, the scarlet seeds contrasting brilliantly with the yellow carpels.

The bearing of the seeds on little-modified leaves springing from the main stem, though an arrangement unique in the recent flora, was a common character among the seed-plants of Palæozoic age. In this respect *Cycas* is a precious relic of a past age.

As first discovered by two Japanese botanists only fourteen years ago, the mode of fertilization in the Cycads and the Maidenhair Tree *(Gingko)* is quite peculiar among living seed plants. While in all the rest the male cells are passively conveyed to their destination—the egg-cell—by the growth of the pollen-tube, in these antique types the old Cryptogamic method prevails—the male cells are capable of active movement.

The pollen-grains are received in a chamber prepared for them in the nucellus or central body of the ovule. The discovery of the pollen-chamber in Cycads was made some seventy years ago by our distinguished countryman, Griffith, though his work was long forgotten.

Pollen-tubes are produced, but they serve chiefly to anchor the pollen-grains in the tissue of the ovule. Two sperms are usually found in each tube; they bear a number of fine protoplasmic hairs or cilia, which are the organs of motion. The sperms begin to revolve while still in the pollen-tube; then it bursts and they are set free; they swim, with a rolling motion, through a drop of secreted water to the egg-cell and accomplish the act of fertilization. In *Microcycas* no less than sixteen active sperms are produced in each pollen-tube, and the number of egg-cells is correspondingly large.

The great seeds of the Cycads much resemble a peach or a plum, for there is a thick fleshy outer layer and a stone within; the whole thing, however, is a seed and not a fruit.

We will now go on to the proper subject of this address, the seed-plants that flourished in the forests of the Coal period. In the rich flora of that time a large proportion of the plants—roughly about half the entire number of species—had the outward appearance of ferns. Their fronds, often of great beauty of form, are probably better known to the amateur than any other fossil plant-remains. So close is this likeness to true ferns that scarcely anyone doubted that this was their nature until a few years ago. In the case of a certain fraction—and rather a small fraction—there is really evidence in favour of this view; as regards the great majority, it is only lately that the question of the mode of reproduction has been in any degree cleared up, and all the evidence available goes to shew that these supposed ferns were in reality seed-bearing plants of the same general type as the Cycads

of more recent times. In a certain number of cases the seeds have been found in connection with the fronds. Thus in a thoroughly fern-like species, *Pecopteris Pluckeneti*, in which no one had suspected any connection with seed-plants, Graud Eury found the little flat seeds, attached by hundreds to the fronds. In the fine "fern," *Neuropteris heterophylla*, somewhat resembling a huge Royal Fern *(Osmunda)* in its foliage, Mr. Kidston found seeds of the size of a hazel-nut. The seeds were attached to stalks which, happily, still bore the characteristic leaflets, enabling the plant to be identified. A good many years earlier the same observer had discovered in the same plant another form of fructification, which we must now regard as representing the pollen-bearing organs.

Other cases of seeds in actual connection with "fern-fronds" have been found by Mr. David White in American species of *Aneimites*, resembling the fronds of the Maidenhair. In a large number of instances, extending to most of the genera of fern-like Coal plants, the association between particular fronds and particular seeds is constant.

In order to gain some idea of the organisation of one of these "Seed-bearing Ferns" of the Palæozoic period, we will take a special case and select one of the commonest fern-like plants of the Lower and Middle Coal-measures. The frond *(Alethopteris)* has long been known—the name "true fern" or "true bracken" shows what complete confidence the discoverer had in its fern-nature. It is a large and handsome, repeatedly divided frond, such as might have belonged to one of the Tree-ferns. The anatomical structure of the frond is known, and its petiole is found in connection with a remarkable type of stem, *Medullosa*, also well known in the petrified condition with its structure perfectly preserved. The stem in this case had three distinct woody cylinders, each of which grew indefinitely in thickness by its own cambium, a curious, and, as it seems to us, inconvenient arrangement, for the different masses of wood, as growth went on, must, one would suppose, have got in each other's way. The leaf-stalks, with their numerous vascular strands and peripheral system of fibrous strengthening-bands are much like those of a recent Cycad, while the leaflets had the typical structure of assimilating organs of the present day.

The associated seeds *(Trigonocarpus)* have in most respects the structure of the seeds of Cycads; in particular, the pollen-chamber is a striking feature, and the seed-coat consisted of a fleshy outer layer enclosing a stone, within which was the embryo-sac. If we may judge from analogy with the related *Neuropteris*, already described, the seeds were borne on the fronds, probably but little modified as compared with the ordinary foliage.

Another example of a fern-like seed-plant of Palæozoic age is *Lyginodendron oldhamium*, of which all the parts are now well known; it has taken many years to completely reconstruct the plant from its fragmentary, though beautifully preserved remains. The foliage is very finely cut and of great elegance of form, recalling some of the living Davallias. The presence of spines on all parts of the frond recalls especially the West Indian Bramble

Fern, *Davallia aculeata*. The stem has in its structure a good deal in common with a recent Cycadaceous stem, but the leaves, in structure as well as in form, are of the fern-type. This is the one case among the seed-ferns in which the pollen-bearing organs are well known. They were discovered by Mr. Kidston five years ago. There is no separate stamen; the little round leaflets, bearing the pollen-sacs on their under surface, form part of the ordinary frond. No doubt the reason why it is so difficult to recognise the male fructifications in these plants is that we are apt to confuse them with the fertile fronds of true ferns. The *Lyginodendron* type of pollen-bearing organ was known long before Mr. Kidston's discovery, but was always regarded as the fructification of a fern.

The seeds of *Lyginodendron* were the first to be recognised in any seed-fern. Although they have not, in the species *L. oldhamium*, been found in connection with the plant, their identification is beyond doubt, for the husk of the seed bears peculiar glands, identical with those on the leaves and stem of the plant itself, the two also occurring in association. The seeds are small, about a quarter of an inch long, and each is enclosed in the husk or cupule which bears the glands just mentioned. It has been suggested by Sir Joseph Hooker that the glands, like the nectaries of flowers, may have had a relation to the contemporaneous insect life—a suggestion of the utmost interest, though not susceptible of proof. The seed itself has a complicated structure, excellently preserved, which need not be further described, beyond mentioning the peculiar pollen-chamber, which has a column of tissue rising up in the middle, limiting the space for the pollen-grains to a narrow annular crevice.

Other seeds of the same type have been found attached to branched stalks, which no doubt formed part of the frond. In some cases numbers of empty cupules, from which the seeds appear to have been shed, are borne on naked branches of the frond.

So far as we know, it was characteristic of the seed-ferns that both kinds of reproductive organs were borne on fronds which were otherwise ordinary vegetative leaves. In this respect these plants were on no higher level than the ferns themselves and so far betray a primitive organisation, complex as their structure was in many ways. As we have seen, there is an approach to this state of things in the female plant of *Cycas*, with its leaf-like, stem-borne carpels.

Another form of Palæozoic seed may be mentioned, which has much in common with that of *Lyginodendron* and may have belonged to some relative plant. As is well known, seeds have an opening or *micropyle*, in the seed-coat, through which the pollen-grains or their tubes are admitted. In the seed referred to *(Physostoma)*, the ordinary micropyle is replaced by an arrangement which may be compared to the mouth of a lobster-pot. The entrance to the seed is guarded by a ring-fence of rods or tentacles, quite separate from one another, but standing sufficiently close to

guide the pollen-grains in the right direction. This has been regarded as a primitive type of seed; it is certainly a peculiar and indeed unique form.

The preservation of the Palæozoic seeds is often surprisingly good; it is quite a common thing to find the pollen-grains in the chamber destined for their reception, and in many cases it has been observed that each grain had a many-celled structure. From the analogy of Cycads and the Maidenhair Tree, it is almost certain that these cells of the pollen-grain produced moving sperms; there is no evidence as yet that a pollen tube was formed, and it may well be that in those early days the spermatozoids had to depend entirely on their own activity to make their way from the pollen-chamber to the egg-cells.

The Seed-Ferns (or Pteridosperms, as they are technically named) must have formed a group of vast extent in Palæozoic times. Although the direct proof of connection between seed and plant has only been found as yet in a few cases, yet in a great majority of the fern-like plants all the probabilities point that way. On present evidence we are justified in believing that at least two-thirds of the apparent ferns of the Carboniferous age were in reality seed-bearing plants allied to the Cycads, and if so, this newly discovered class was the most extensive of all known groups of plants in those days. Our still very imperfect knowledge of the Devonian flora indicates that the seed-ferns were already prevalent at that early period.

The resemblance to ferns which exists to some extent in living Cycads, and to an infinitely greater extent in their Palæozoic predecessors, is far from being fallacious. Besides the mere habit, there is much in the anatomical structure and in the characters of the male fructification to indicate a real affinity with the fern-stock. The connection, however, must lie enormously far back in geological time.

I have only had time in this address to speak of the *Fern-like* seed-plants of the Coal period. There were other seed-plants, no less ancient and of a higher type of organisation, approaching in some respects our living Coniferæ. Their existence at so early a period affords a striking proof of the vast unknown course of evolution which lies behind our oldest palæontological records of a Land-flora.

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The address was illustrated by a large number of lantern-slides, mostly from photographs of the specimens.

# Report of General Lectures delivered during the Winter Session, 1910-11.

**Corfe Castle and the Royal Forest of Purbeck.**

This lecture was given on 12th November, 1910, by H. Pouncy, Esq., Assistant Secretary of the Dorset Field Club, and was open to the public on the purchase of tickets. The chair was occupied by Sir Daniel Morris. Mr Pouncy incidentally pointed out that there is no evidence that a castle existed at the time of the murder of King Edward at "Corfes-Geat," which took place at Elfrida's house and might possibly have been on the site of Corfe Castle. This is certainly good 12th century work, and may have been started by William the Conqueror, and the fact that King John kept his Queen and his regalia there shows the importance of the place. The lecture was illustrated by numerous very beautiful lantern slides, and Mr. Pouncy held his large audience enthralled while relating the thrilling scenes enacted at the Castle in the height of its glory. It was interspersed with snatches of folk-lore delivered in lucid language and with much humour.

**An Address introductory to the Study of Geology.**

On the 17th December, 1910, an address was given by Dr. Wm. T. Ord, Chairman of the Geological Section, to which the attendance of the Bournemouth Students' Association had been invited. The chair was taken by Dr. Crallan. The special object of the lecture was to attract those who were interested in that branch of Science, and to induce them to attend a forthcoming series of lectures by Rev. E. C. Spicer, M.A., F.G.S., dealing chiefly with the geology of Hampshire and Dorset. Dr. Ord described Geology as a study of the materials and structure of the earth's crust by examination of sections or cuttings where rocks are exposed, such as exist along our seashore; and he spoke of the forces which had been at work from the earliest ages, breaking down, building up and forming fresh strata, the most potent agent being water, *i.e.*, the sea, rivers, rain and ice. A notable example of the agency of rivers is that of Colorado Cañon, cut to the depth of nearly a vertical mile through very hard rock. He also gave a brief account of the importance of fossils in determining the age of rocks and of the geological series of strata from the earliest times down to the later. Many beautiful lantern slides were shown, which had been lent by Mr. Spicer and Mr. H. Pouncy, assistant secretary of the Dorset Field Club.

**Telescopes: their History and Construction.** A lecture on this subject was given on 14th January, 1911, by E. W. Barlow, Esq., F.R.A.S., the chair being taken by Geo. Brownen, Esq. As a scientific instrument the telescope is one of the oldest, and in general use as opera glass, field glass, terrestrial or astronomical telescope. Two types of telescope were described, viz., refracting and reflecting. The origin of the former is ascribed to Lippershey, a Dutch spectacle maker in the 17th century, but there is evidence to show that the theory of the telescope was known to our own countryman Roger Bacon in the 13th century. The fame of Galileo, besides his constructive genius, rests on his application of the invention to astronomy, though neither his form of instrument nor that of Lippershey are now used except for opera glasses. An achromatic lens is a combination of a concave lens made of crown glass and a convex lens of flint glass, and the discovery of how to make larger lenses led to the giant refractors of the present day, the two largest being the Yerkes, the lens of which is 40 inches in diameter, and the Lick of 36 inches. A large number of slides were shown of English, American and foreign observatories and instruments.

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**Highways and Byeways in Belgium.** This was the title of a lecture given on 28th January, 1911, by C. J. Hankinson, Esq., J.P., illustrated by lantern slides from his own photographs, Dr Crallan presiding. Mr. Hankinson followed the course of his own tour through cities, towns, and villages of Belgium, and showed views of interesting architectural and ecclesiastical buildings, interiors of old houses, doorways, and country scenes, and groups of factory girls and children, to illustrate the well being of the people.

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**Roses and their Culture.** On 18th February, Mr. J. B. Stevenson, F.R.H.S., gave a lecture on Roses and their culture, Sir Daniel Morris being in the chair. Mr. Stevenson first described the method of preparing the ground, and selection of a sheltered situation, advising deep culture. He mentioned the three best stocks for roses as the Dog-rose stock, the Manetti, and La Grifferne, a French stock, and explained methods of planting, pruning, watering and mulching. Insect pests were then dealt with and the means for their destruction. The lecture concluded with a number of beautiful slides of rose pillars, pergolas, and rose gardens at noted houses and at Kew.

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**Recent Discoveries in Tropical Diseases.** This was the title of a very interesting lecture given on 25th February, by Dr. Sandwith, F.R.C.P., on recent discoveries in tropical medicine in connection with malaria, Malta or Mediterranean fever and sleeping sickness. Dr. Roberts Thomson presided at this meeting. Though known to the ancients, malaria

was never scientifically studied till after the introduction of Cinchona bark into Europe by the Countess of Chinchon: one of the earliest patients cured was Charles II in 1679. In 1880 M. Laveran, an army surgeon, first discovered parasites in malarial blood, and by observing the effect of quinine upon them, it became known why quinine was so beneficial. In 1897 the mosquito was proved to be the infecting agent. Malta fever, a slow and painful disease, was at one time a scourge to our Army and Navy in Malta; prolonged investigation showed that goats' milk, universally drunk by the civil population, was answerable for the infection, and now, the milk being boiled, the disease is practically stamped out in both Navy and Army. Sleeping sickness is conveyed both to man and animals by two distinct varieties of the tsetse fly: it is first characterised by irregular fever and an eruption, then by an enlargement of the glands of the neck and other parts of the body, trypanosomes are found in the blood and glands, and eventually spread to the brain and spinal cord, causing loss of memory, emaciation, and finally drowsiness and stupor which have given the disease its popular name. Many fine slides showed the terrible progress of the disease, and the working of the malarial parasite in human blood, and also pictures of the haunts of the mosquito. The lantern slides were lent by the Research Defence Society.

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**Experiences and Impressions of life among the Japanese.**

A lecture with this title was given on 11th March, by S. McCalmont Hill, Esq., D.C.L., in a light and amusing vein and illustrated by lantern slides. Dr. Hill described the home life of the Japanese and showed a fire box and domestic hearth used in house, railway, in the theatre, and as a bedwarmer (lent by the Corporation Art Gallery); also costumes, toilet requisites, pipes, specimens of native tobacco, and some humorous carved ivory figures. A Japanese dinner party was also described and the use of the "hachi" or chopsticks.

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**Jerusalem, Jericho and Bethlehem.**

On 1st April, Canon Cooke Yarborough, Vicar of Christchurch, delivered a lecture with this title, with lantern slides from sketches made by himself, under the presidency of Dr. Crallan. The Jerusalem of to-dav differs from that of the Bible owing to the changes during eighteen centuries, and causes disappointment in the first impressions of many tourists. A map of Palestine explained the unique position of the country as a connecting link between three continents; there is much uncultivated land, specially in the Valley of the Jordan, the misrule of the Turk stifling all energy. Recent excavations at Geser, a hill town between Jaffa and Jerusalem, reveal many towns built one over another in layers, dating from 3000 to 100 B.C., and gruesome remains indicate human sacrifices and a heathen stronghold. Jerusalem, standing on a very steep hill, is impregnable on three sides, with no protection on the north. The increase in population at the present day in the course

of about 50 years is remarkable, and consists chiefly of the very poor and decrepit, and crowded into a small area. Lantern slides showed many interesting features of the Holy City, the beautiful Mosque of Omar on the site of the Temple of Solomon, the Mosque El Akon, said to be an archæological puzzle, the Church of the Holy Sepulchre, a tomb hewn in a rock in a garden, known as "Gordon's Golgotha," a subject of various traditions, views of the Garden of Gethsemane and of the Dead Sea were also shown, a house at Bethany believed to be that of Martha and Mary, and at Bethlehem the actual cave in which the Infant Christ was born, over which the Christian church is built, a silver cross on the floor showing the exact spot.

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**Mediæval Costumes as illustrated by the Monuments in Wimborne Minister.**

On 29th April, a lecture was given on Mediæval Costumes by Miss Ida M. Roper, F.L.S., of Bristol, which is fully reported on page 69.

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**Micro-Cinematography.**

On 6th May, a remarkably interesting and instructive exhibition of Micro-Cinematography was given by arrangement with Messrs. Pathé Frères (of London and Paris) before a very large audience. This was the first time on which this wonderful development of modern scientific research had been shown in Bournemouth. The images of living and moving microbes as seen under high microscopic power were shown moving with great activity. About 4,000 feet of film were used. Among the films shown were (1) Human blood, the corpuscles, etc., in active movement in the circulation; (2) Trypanosoma, or the disease producing "Sleeping Sickness," its microbes shown in vigorous movement in the blood of a patient; (3) The microbes of relapsing fever, as living and growing in the body; (4) Examination of the human stomach under X Rays, showing the movements by which digestion is carried on; (5) Life history of the Carrot Caterpillar, from the larva to the perfect butterfly, shown coloured and in movement; (6) Birds in their nests, their movements and habits as photographed. Regarding the cinematograph as applied to microbes and other such objects the methods used are (1) By transmitted light, as in ordinary microscopic work; or (2) by reflecting the light on the object placed on black paper, from the side while looking through the microscope, the latter mode being used in micro-cinematographic work, and is a valuable means of affording scientific instruction. An explanation of each film was given by G. G. Hamilton, Esq., M.B., F.R.C.S. ENG. A former pupil of his at the Liverpool University, Mr. Dutton, was the first to discover trypanosoma in human blood (though it was left to Sir David Bruce to associate it with "Sleeping Sickness") and while further investigating relapsing fever he lost his life from that disease at the early age of 24.

# Report of General Summer Excursions, 1911.

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**Tarrant Valley.**

On the 17th May, a large party of members went by train to Blandford, whence brakes conveyed them first to Buzbury, a pre-historic camp and fortified hill-town 360 feet above sea level; during lunch Mr. Brownen described the place. About eight acres are still enclosed by a rampart and ditch, and within the enclosure indications of pit dwellings are visible, and some pre-historic pottery was found by one of the party. The foundation of this camp is attributed to the Iberian or Stone-weapon man of the long barrow age. At a later time these settlers were driven over the Wilts border up the Tarrant Valley and out of the county by Celts from Gaul armed with bronze weapons. From Buzbury the party moved on to Tarrant Rushton where they were received by the Rector (Rev. J. Penny, M.A.,) who kindly gave light refreshments, showed his magnificent collection of geological, botanical and entomological specimens, and the 13th century church containing many features of great interest. The party then drove down the valley past Tarrant Keynston to Tarrant Crawford and the site of Tarrant Abbey, of which the only remaining relic is the old Abbey barn. Mr. G. Galpin here read a short paper on the Cistercian Abbey or Nunnery. The Parish Church of St. Mary was next visited and the Rector (Rev. P. Wingate) described its points of interest. The party then went on to Spettisbury and after tea climbed the ramparts of this ancient fortress and returned home by train.

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**Beaulieu and Cuffnells.**

This very interesting excursion was made by about 70 members on the 14th June, by train to Brockenhurst, one section driving direct to Beaulieu Abbey, the other halting en route at Hatchet Pond to search for botanical and zoological specimens. After lunch in the ruined cloisters, Mr. Brownen gave an account of the Abbey in the ruins. The whole party then drove by Tantany Wood and Matley Bog to Cuffnells where they were very kindly received by the owner (R. Hargreaves, Esq., J.P.). Cuffnells was the residence of Mr. George Rose, a friend of King George III, who honoured the house with occasional visits. The interesting fact was mentioned that Mrs. Hargreaves was the original of "Alice" in "Alice in Wonderland." Sir Daniel Morris assisted Mr. Hargreaves in pointing out the various trees, etc., in the "Wilderness." Among them were some very fine specimens of Sequoia 100 feet high planted within the last 50 years; other majestic trees are Wellingtonia, the giant tree of California, Abies Nobilis, and large Portugal laurels in flower. A Himalayan rose, in full bloom, climbing over a lofty Cryptomeria, was very

striking, also a tulip tree 80 feet high just coming into flower, and an Oriental plane tree, probably one of the finest in the neighbourhood. In the garden near the house a rose garden, and a rockery with interesting rock plants were much admired. The large party were most hospitably entertained at tea on the terrace in front of the house by Mr. and Mrs. Hargreaves, and then drove back to Brockenhurst and returned home by 7.16 train.

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**Old Sarum.** A visit to this interesting spot was made on 19th July, by a large number of members, arriving about noon at Salisbury by train from Bournemouth, then driving to Old Sarum. Col. Hawley, F.S.A., with J. L. Hammond, Esq., who were in charge of the works, conducted the party over the various parts of the old Norman Castle disclosed by the excavations, the Treasury, the Guarderobe Tower with its remarkable pits, the great Tower and its blocked postern and the Gatehouse which had evidently been a first line of defence of great strength. The formidable character of this fortress of Norman times is shown by its position on the natural hill strengthened by the chalk having been deeply cut and thrown up to form a very steep escarpment. After crossing the site of the great Norman Cathedral a portion of the original city wall was seen *in situ*. A number of articles discovered during excavation were exhibited in the small temporary museum, and though these date from the 11th Century, it is believed that Saxon, Roman, and Celtic relics lie at a greater depth, sufficiently tempting for further research. The party drove back to Salisbury and were conducted over the hall of John Halle, a merchant burgess of Salisbury, and after tea at Sutton's returned to Bournemouth by the 4.54 train.

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**Portland.** This excursion to Portland took place on 9th August. The party, consisting of 22 members arrived about 10.15 at Portland Station and were there met by F. J. Barnes, Esq., proprietor of some large quarries, who took them by motor train to Easton in the centre of the Island. After giving a sketch of the history of Portland, Mr. Barnes led the party through the public garden to Pennsylvania Cottage, and there, during lunch, told many interesting details of the customs and laws of Portland relating to marriage and land tenure. Proceeding along the cliffs, various points of interest including the prison were described. At St. Peter's Church, built and decorated by convicts, the Verger, an old warder, gave some information of interest. Mr. Barnes then conducted the party to the "Devil's Hole," one of his quarries, where he showed the machinery for cutting and shaping the stone, and explained the methods of working and the geology of the strata. During tea in the garden of the George Inn, two "Reeve Staves" were shown and their use in connection with rent collection explained. On the way back to the station, by the courtesy of the Commanding Officer, the party were allowed to pass through the "Verne Fort" from which they enjoyed a very beautiful view of the

Breakwater and Chesil Beach. Dr. Crallan having thanked Mr. Barnes in very cordial terms, the party returned to Bournemouth.

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**Arish Mell and Flowers Barrow.**

This excursion was arranged for 13th September, and about 70 members started by train to Wareham and thence in brakes to East Lulworth, but owing to heavy rain, were obliged to give up the excursion and return direct to Wareham. After tea at Bennett's, the rain having ceased, some of the party visited the old Saxon Church of St. Martin. A similar fate befell this same excursion last year.

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**Breamore and Downton.**

A number of members, conducted by Mr. J. M. French made an excursion on 4th October, to Breamore and Downton. On arriving at Breamore Station the party drove to the site of the ancient Augustinian Priory, all traces of which have vanished. Mr. Brownen gave a brief description of the Priory. They then went to the church where Mr. French read a descriptive paper. After a brief stroll in the Park of Breamore House they drove on past Charford, the scene of a battle A.D. 519, described as the Waterloo of Wessex, to Downton. Here they visited the famous Moot (now the garden grounds of Mrs. Squarey) and also the Parish Church of St. Lawrence, in Norman, Early English and Perpendicular styles of architecture, Mr. French giving descriptions at each place. After tea at Mrs. Parrott's the party returned home from Downton Station.

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# Proceedings of Sections.

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## Archæological and Historical Section.

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CHAIRMAN: G. BROWNEN, ESQ., F.C.S.

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**11 Nov., 1910.**

The opening meeting of this Section was held in the Society's Rooms, Granville Chambers. The Chairman of the Section gave an address on the results of antiquarian research during the past year and indicated some local methods of working that might prove both useful and interesting for the Section.

At the close of the meeting there were exhibited a number of relics obtained and lent by Mr. Chambers, a member of the Society. These relics were found by him on the prehistoric sites at Pokesdown and Southbourne. The thanks of the meeting were given Mr. Chambers for his exhibits.

**3 Dec., 1910.** A conjoint meeting of the Archæological and Geographical Sections was held under the presidency of Miss Rooper, the Chairman of the Geographical Section, A. Scott, Esq., having recently died. The Chairmen of both sections, Messrs. Scott and Brownen, proposed to discuss a scheme having for its object a new map of the locality having Bournemouth for its centre and showing the relationships of the modern Ordnance Survey with the older Norman Domesday and the Roman Centuriation. Great regret was expressed that this project was interrupted by the death of Mr. Scott, but it was considered advisable that Mr. Brownen should give his address on the Centuriation of Britain by the Romans. Mr. Brownen noticed several points on which himself and the late Mr. Scott were prepared to act, but it was felt that any active work would have to be postponed for a time.

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**26 Jan., 1911.** At this Section meeting Mr. Brownen, the chairman, gave a lantern lecture on The Berkeley Chauntry in Christchurch Priory Church. Besides views of this late 15th century chauntry considerable historical references were made illustrative of the Hampshire branch of the Berkeley Family, etc.

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**16 Feb., 1911.** Mr. Acutt, of New Milton, described the finding of a broken funerary urn of the Bronze Age at Becton gravel pit. The Section was greatly interested in the novel way in which Mr. Acutt pieced together the fragments he had obtained so as to give the urn's size and form. The lecture was illustrated by diagrams and photographs.

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**23 March, 1911.** The Rev. G. Field, of Throop, gave a lantern lecture on Kenilworth Castle and its architectural and historical associations.

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**20 April, 1911.** The winter session of indoor lectures, etc., was closed by the Chairman of the Section giving a lantern lecture upon our Local Feudalisms: No 1, the De Redvers Family A.D. 1100-1295.

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Two general lectures possessing Archæological interest were delivered to the Society during the winter session of 1910. The first was a lantern lecture on 12th November, 1910, by H. Pouncy, Esq., on Corfe Castle and the Royal Forest of Purbeck. The second lecture was by Miss T. Roper, F.L.S., of Bristol, and its subject was "Mediæval Costumes as illustrated by the Monuments in Wimborne Minster." This lecture was delivered in Trinity Hall on 29th April, 1911, and appears in full on page 69.

## Summer Session 1911—Excursion Season.

**17 May, 1911.** This general excursion to the Tarrant Valley was chiefly of Archæological interest as—Buzbury and Spettisbury—date from prehistoric times, while Tarrant Rushton and Tarrant Crawford Churches and Tarrant Abbey Barn were relics from the middle ages. The nicely arranged museum of natural history, the property of the venerable Rector of Tarrant Rushton, was particularly appreciated.

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**27 May, 1911.** This was nominally the first Sectional excursion of the Society for the season. It was to St. Catherine's (or Katterns) Hill north of Christchurch, and the sites of the ancient Belgic hill town, the exploratory Roman camp and mediæval chapelry of St. Catherine were in turn visited and described.

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**14 June, 1911.** The first part of this general excursion to Beaulieu and Cuffnels, Lyndhurst, was of Archæological interest, inasmuch as it consisted of a visit to the ruins of the Cistercian Abbey of Beaulieu, founded by King John in the early part of the 13th Century.

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**28 June, 1911.** Two Sections—the Archæological and Photographic—combined together in a visit to Netley Abbey, an offshoot from Beaulieu at a slightly later date in the 13th Century.

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**19 July, 1911.** This general excursion to Old Sarum and Salisbury was essentially antiquarian in character. The great advantage in this excursion was that the excavators of the Society of Antiquaries in charge of Old Sarum most courteously exhibited and described the excavations of the Sarum fortress.

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**26 July, 1911.** A combined Botanical and Archæological excursion was made to Corfe Castle, Rempston Stone Circle and Studland.

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**9 Aug., 1911.** The general excursion to Portland included the inspection of many of the antiquarian and prehistoric remains of that district.

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**30 Aug., 1911.** The Archæological excursion of this date to Moyles Court was, by the kind permission of Haigh Thomas, Esq., permitted to enter the rooms made historic by the tragedy of Lady Alice Lisle. The ancient church at Ellingham and the site of its Alien Benedictine Priory and the 15th Century brass of Dr. John Prophete, the last Rector of Ringwood, now lying in Ringwood Church, were also visited in this excursion.

**9 Sept., 1911.** The Archæological, in conjunction with the Photographic Section, visited Witchampton, a most picturesque Dorset village, and afterwards the remarkable ruins of Knowlton Church, standing within a prehistoric fortress of the Bronze Age.

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**27 Sept., 1911.** On this date the Archæological and Photographic Sections of the Society again united to visit Crouch Hill, a mound fortress in Stanpit Marsh, near Christchurch, a site near a Roman Via and also famous for events in the 10th Century. Afterwards the party inspected the broken Christchurch Bar and the new outlet of the rivers Avon and Stour.

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**4 Oct., 1911.** This excursion, the last of the season, was to the site of the Augustinian Priory of Breamore, from thence to the ancient church of Breamore and its Saxon remains; and from these passing through the Park to the front of Breamore House, the Tudor Mansion of Sir E. Hulse. From Breamore the excursionists proceeded to Downton and inspected the famous mounds now in the gardens of the Moot House. From the Downton Moot the party passed to Downton Church, and J. M. French, Esq., who acted as the conductor for the party, read papers both at Breamore and Downton which enabled the party to understand the churches visited.

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## Botanical Section.

CHAIRMAN: MISS C. AGNES ROOPER.

During the Winter and Spring Sessions a few members of this Section under the leadership of the Chairman (Miss C. Agnes Rooper) met every Tuesday morning in the Society's Rooms to arrange the Society's Herbarium.

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**Nov. 19, 1910.** A Sectional meeting was held in the Society's room. Mr. Alexander Scott presided. A paper illustrated by magic lantern slides on the geographical distribution of trees was read by Miss C. Agnes Rooper.

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**Dec. 15, 1910.** Sectional meeting. The subject for the meeting was short communications on botanical specimens of various kinds. (Miss C. Agnes Rooper presided.) Sir Daniel Morris, K.C.M.G., gave a most interesting lecture on the Citrus or Orange Family. Mrs. Nicholson showed two curious balls formed of the debris of sea-weed rolled up by the action of the sea. These had been found on the shores of the Mediterranean. Miss C. Agnes Rooper showed and described a specimen of *Tillandsia usneoides*. She exhibited and drew attention to the mildew known as *Oidium Euonymi-japonicæ*.

**Jan. 5, 1911.** Sectional meeting. Miss C. Agnes Rooper presided. For this meeting members had been invited to ask questions on botanical subjects to be answered by Miss Rooper and others. Miss Chidell desired information about the *Cyperaceæ*. Mr. Parmiter read a short paper on the Halophytes (Salt-worts). Miss Chidell exhibited fruit of the Calvery Clover; Mr. Parmiter some fossils; Mr. Le Jeune some leaves attacked by rusts. Finally Miss Rooper described the structure of Lichens illustrated by diagrams.

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**Feb. 9, 1911.** Sectional Meeting. (Botanical, Microscopical and Zoological.) Mr. Wells presided. A demonstration was given by the Rev. L. T. Garland of a very fine series of slides of botanical and zoological specimens by means of a projection lantern microscope.

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**March 10, 1911.** A Sectional meeting was held (Miss C. Agnes Rooper in the chair) when a paper was read by Sir Daniel Morris in behalf of Mr. George Massee, F.L.S., of the Royal Gardens, Kew, on the mildew attacking the Japanese Euonymus (Oidium Euonymi-japonicæ). Specimens of leaves were exhibited with the mildew and the life history of the Oidium was fully explained with diagrams. (The paper with an illustration appears in this volume, p. 81.)

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**March 25, 1911.** Expedition to Bailey's Gate and Lychett Maltravers. Party consisted of Mr. F. V. Sherring, F.L.S.., Miss Chidell, Miss M. Chidell. Flowers reported were Viola odorata, Narcissus Pseudo-Narcissus, Barren Strawberry, Dogwood in bud, etc.

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**April 7, 1911.** Sectional meeting. Miss C. Agnes Rooper undertook to answer botanical questions asked by the members. Mr. Parmiter inquired if the Mosses were derived from Algæ in the chain of descent. Mr. Sherring exhibited his specimens of dried Characeæ, Equisetaceæ and Ferns.

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The season was so hot and dry that few excursions by the whole Section were taken, but individual work was very successfully carried out. The working Section has benefited by new members but it has lost much by the departure of Dr. Dixon to another sphere of work.

The chief districts covered this year by excursions and individual work were as follows:—

Freshwater, I. of W.
Wareham.
Corfe Castle and River.
West Moors.
Swanage.
Tarrant Valley.
Verwood.
Wool.
Christchurch.
Morden Decoy.
Hatchet Pond.
Ringwood.
Holmsley.
Studland.

In these districts much ground new to the working members has been covered. The genus Carex has received much attention. A photograph has been added to the collection of Orchis Latifolia maculata found by Messrs. Linton and Sherring.

Mrs. Nicholson added to the list of Flowers, Habenaria bifolia (Lesser Butterfly Orchis); Thesium humifusum (Bastard Toad flax) Lathyrus Aphaca (Yellow Vetchling) and Hydrocharis Morsus-ranæ (Frog-bit). Miss Chidell: Erophila verna (Whitlow grass) and Claytonia sibirica.

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**Fungus Foray in the New Forest.**

On the 11th October, members of the Botanical Section, conducted by J. F. Rayner, Esq., F.R.H.S., met at the Beaulieu-road Station to collect Fungi. The Heath and Tantany Wood were explored and furnished a satisfactory yield, considering the long drought. Among others were Collybia maculata, Boletus luteus, Cantharellus aurantiacus, Dœdalea quercina, Polypore intybaceus and giganteus, Clitopilus prunulus, Hypholoma fasciculare, and epixanthus, Amanita muscaria, Stropharia squamosa, the poisonous Amanita mappa and the edible Fistulina hepatica, Boletus edulis and Clitocybe nebularis.

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The Section is much indebted to the kind help of the Rev. E. Linton, Mr. J. F. Rayner and Miss Ida Roper, F.L.S.

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List of British Plants Collected during 1911:—

12 Adonis annua, L. (Pheasant's Eye)
40 Caltha palustris, Linn. b. (Guerangerii, Bor.) (Marsh Marigold)
79 Matthiola incana Br. (Hoary Stock)
132 Brassica oleracea, L. (Wild Cabbage)
152 Lepidium hetrophyllum, Benth. (Smooth Field Pepperwort)
159 Teesdalia nudicaulis, Br. (Shepherd's Cress)
181 Viola lactea, Sm. (Smith's Dog Violet)
276 Hypericum Androsæmum, L. (Tutsan)
289 ,, elodes, L. (Marsh St. John's Wort)
335 Rhamnus Frangula, L. (Black Alder)
348 Ononis reclinata, L. (Small Rest-Harrow)*
413 Vicia lathyroides, L. (Spring Veitch)
415 Lathyrus aphaca, L. (Yellow Vetchling)
554 Geum rivale, L. (Water-Avens)
609 Pyrus torminalis, Ehrh. (Wild Service-tree)
617 ,, Aucuparia, Ehrh. (Mountain-Ash)
667 Drosera anglica, Huds. (Larger Long-leaved Sundew)
668 ,, longifolia, L.† (Lesser long-leaved Sundew)
719 Apium inundatum, Reichb. fil. (Least Marsh Wort)
775 Adoxa Moschatellina, L. (Moschatel)
1089 Jasione montana (c) littoralis, Fr. (Sheep's Scabious)
1094 Campanula Trachelium, L. (Nettle-leaved Bell-flower)
1111 Erica ciliaris, L. (Ciliate Heath)
1164 Centaurium capitatum, R. and B. (Tufted Centaury)
1186 Pulmonaria angustifolia, L. (Narrow-leaved Lungwort)
1213 Hyoscyamus niger, L. (Henbane)
1306 Utricularia minor, L. (Smaller Bladderwort)
1312 Pinguicula lusitanica, L. (Pale Butterwort)

1324 Mentha Pulegium, L. (Penny Royal)
1386 Scleranthus annuus, L. (Knowel)
1460 Thesium humifusum, DC. (Flax-leaved Toad-Flax)
1529 Hydrocharis Morsus-ranæ, L. (Frog-bit)
1531 Malaxis paludosa, Sw. (Bog Orchis)
1559 Orchis incarnata, L. (Common Marsh Orchis)*
1561 ,, latifolia x maculata (Natural Hybrid)
1581 Crocus officinalis, Huds. (Purple Spring Crocus)
1665 Typha angustifolia, Linn. (Less Reed-mace)
1755 Rynchospora fusca, Ait. (Brow Beak-rush)
1756 ,, alba, Vahl. (White Beak-rush)
1758 Schœnus nigricans, L. (Bog-rush)
1988 Asplenium marinum, L. (Sea Spleenwort)
1907 Ceterach officinarum, Willd. (Rustybach)
2007 Lastrea Thelypteris, Bory (Marsh-Fern)
2008 ,, montana, Moore. (Sweet Mountain Fern)
2013 Lastrea spinulosa, Presl. (Narrow Prickly-toothed Shield Fern)
2031 Equisetum palustre, b. polystachyum, Weigel. Marsh Norsetail)
2039 Lycopodium inundatum, L. (Marsh Club-moss)

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REFERENCE TO PLATE I.

*Orchis latifolia x masculata.*—This Orchid was found near Edmondsham by Messrs. Linton and Sherring, and is referred to in "Flora of Bournemouth" (Linton), page 208, and also 10th Edit. "London Catalogue" under No. 1561. Mr. Linton says, "You may safely call the Orchis, O. latifolia x maculata (I arrange the names alphabetically) though it presents more of the general features of O. maculata than the other parent."

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† PIERIDÆ DESTROYED BY DROSERA.—Mr. R. Vowell Sherring, F.L.S. has reported the following interesting incident. He was on the 20th July, 1911, botanizing in a bog to the south east of Corfe Castle to Wareham Road, Dorset, when he noticed what he took to be a number of white flowers in the bog. Upon examination these proved to be the wings of Pieris rapæ and P. napi, which insects had been captured by the Sundew—Drosera rotundifolia. The most likely explanation for the butterflies having come to an untimely end in this manner that suggests itself to me is the following. The summer of 1911 was abnormally hot and abnormally dry. The Pieridæ are a notoriously thirsty family and I had noticed myself at other places that this year they had congregated very much in the bog. The Droseras, especially longifolia and anglica, practically grow out of the water. I think the unfortunate Pierids settled on the plants as being convenient stands from which to get a drink and the Droseras closed on them and devoured them.

* Mr. R. Vowell Sherring, F.L.S., has established the fact that the pale coloured Orchis at Culease is O. incarnata L. The plant was forwarded to the Rev. E. F. Linton, M.A., and returned as true to type. See Flora of Dorset, 2nd Edit. 1895, page 257.

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# Geographical Section.

ACTING CHAIRMAN: GEORGE DE CASTRO, ESQ., M.R.C.S. ENG.

Owing to the sudden death of Mr. Alexander Scott, B.A., in the month of November, this section was deprived at the very beginning of the winter session of its Chairman, who, from his experience as a distinguished teacher, was so well fitted to lead it to do good work in the Society.

Amongst the fixtures for the month of December was a paper, to be read at the opening of the session by Mr. Scott himself, on "The System generally adopted by the Romans in the laying out of rural estates, roads, etc."

**Orchis latifolia x maculata.**

This meeting was cancelled, but some members of the Section met, and Mr. George Brownen, F.C.S., gave an address on "The Local Aspects" of "The Roman Centuriation" in S.W. Hampshire, with the proposed preparation of a map of the district by members of the Society.

Here again, especially, the loss of their Chairman has been felt by the section, as he would have been an active co-operator with Mr. Brownen in the production of the suggested map, which, for the time being at least, had to be postponed, chiefly from the fact that no member having the necessary qualifications could be found to undertake to assist in the work which it entailed.

At a Council Meeting held on the 17th January, 1911, Mr. George de Castro, M.R.C.S. ENG., etc., was appointed to fill the vacancy as Chairman of the Geographical Section until the end of the current year, and subject to the approval of the next Annual Meeting.

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**Demonstration in Relief Map Making.**

On Saturday, 21st January, 1911, a meeting of the Section was held in the Society's Rooms, when Dr. Ord, the Chairman of Council, asked Mr. George de Castro to take the chair.

After referring to the loss the Society, generally, had sustained by the decease of Mr. Alexander Scott, and thus accounting for his presence in the chair, he introduced Mr. F. I. Babb, B.SC., F.C.P., of Weymouth, and Mr. W. I. Stanton of Wimborne, and asked them to commence their demonstration in Relief map making: a syllabus of the lecture was handed to those present.

After explaining how the Contour Lines are drawn, they proceeded to show how the Vertical or "Serial Sections" were produced, and joined together cardboard sections and Plasticine into sandwiches; these were built up, in a frame, into a model from which a mould was taken in plaster and the surface covered with patent knotting and oil.

From this mould a plaster cast was made, which could be coloured and finished afterwards.

This process is the most correct one, but has to be commenced and carried out without delay; a large class can best do the work quickly and efficiently.

Mr. Stanton then demonstrated the Horizontal or Layer method; the contours being traced upon and cut out of cardboard of various thicknesses to represent the heights—the model being built up of these layers and hot glue, and the terraced appearance eliminated by hand with a sharp penknife.

Mr. Babb next constructed a small model of Hindostan on the "Impressionist" method with Horizontal Layers, which he cut out of Plasticine with a small knife "at sight."

The whole demonstration was not only exceedingly practical but distinctly inventive, and was also most lucidly explained. At its close Dr. Ord, in moving a resolution of thanks to both Mr. Babb and Mr. Stanton, suggested the making of a relief map of

the Bournemouth district. This, however, could not be carried out, but later in the year a map in relief of the Isle of Wight, and also one of Dorset have been made, and are on view in the Society's Rooms.

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**The Physiography of the Hydrosphere.**

This was the title of an exhaustive paper read by Mr. Charles J. Parmiter, on March 2nd. In introducing the subject, it was pointed out that the study of geography, as one of the bases of a liberal education, was gradually obtaining recognition in this country, and considerable attention was being given to Oceanographical research.

Five-sevenths of the surface of the globe are covered with the hydrosphere—the two-sevenths which appear above the hydrosphere represent the dry land.

If the hydrosphere were to evaporate, profound depressions, separated by mountain ranges, would be the predominating features.

The height of Mount Everest in the Himalayas and the depth of the Ladrone Basin in the Pacific Ocean would together give a vertical range of over twelve miles.

The Great International Deep in the Atlantic Ocean is more than five miles, and the average depth of the Hydrosphere is about two-and-a-quarter miles.

The pressure at the depth of one mile below the surface exceeds one ton on every square inch, and on the floor of the deepest depression would amount to five tons.

A brief description of the difficult problem of the tides, of the salinity and temperature of the oceans was also given; and an account of the constructive work of the coral polyp, as also of the deposition of calcareous ooze, mixed with Radiolaria and diatoms found on the floor of the deepest ocean brought the paper to a close.

A number of mineral specimens were shown in illustrating the paper, and the Chairman exhibited a sample of Globigerina ooze brought up from the deep Atlantic.

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**British Roads and their History.**

On March 25th Mr. Pretor W. Chandler, of Lincoln's Inn, read a paper entitled "British Roads—their history and development." Reference was made to the roads constructed in Britain during the Roman occupation, which have never been equalled.

In Saxon times the earliest roads were mere tracks along which horses could be taken, and some followed the beds of streams.

In the Norman Period the Church repaired roads, and built bridges, as "Service to God"—and the monasteries maintained those around their lands. Later the Lords of Manors claimed tolls for the use of their roads, and they kept them in repair, but with the decline of the manorial system they were neglected.

In the reign of Edward I statutes were passed for clearing the land on the sides of main roads, and under Edward III owners of property had to repair that part opposite to their holdings.

In the XIVth Century London taxed all horses or carts bringing merchandise into the city and expended the revenue in the making and repair of roads leading thereto.

In 1555 the first Highway Act was passed, which sanctioned compulsory labour on roads, and the parishes appointed surveyors to see the Act duly carried out. Later they were given power to take stone for the purpose of repair within their parishes without the leave of the owners.

In the reign of Elizabeth long-waggons, which carried both merchandise and passengers, came into use, but the roads were broad shallow ditches strewn with loose stones.

In Charles' II time the burden of maintenance was shifted by assessment from the land-owner to every inhabitant of the district, and the surveyors had power to levy tolls on all traffic passing along the roads.

During the reigns of Queen Anne, George I and George II, local Acts to maintain roads by tolls were passed, but the system was a failure, and a Royal Commission condemned it as open to great abuse and evasion.

With the Enclosures Acts of 1805-10 immense improvements took place, as the money obtained from the sale of waste lands was used to make both main and side roads, and all these had to be kept in order by the parishes through which they ran. The turnpike Acts of succeeding years in course of time added greatly to the number and gave some 22,000 miles of good road-ways spread all over the country, and during the past fifty years a more scientific manner of road building introduced by Macadam and others has changed the old roads with their dangers and discomforts into routes which can be traversed with pleasure and ease, either on foot, on horse-back, or in any wheeled vehicle.

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**A Glance at our Chines.**

On the 8th April Mr. George de Castro read a short paper entitled "A Glance at Our Chines." Miss C. Agnes Rooper, a vice-president of the Society, occupied the chair.

The reader referred to the word "Chine" as being an old provincial and purely local word, only used in its geographical sense here and in the Isle of Wight, and not to be found in any ordinary dictionary.

It represents a short but deep and narrow ravine gradually cut in various soft strata by a small stream descending somewhat slowly to the sea, its bed being formed from the débris fallen from either bank, but some are rather more than that, and help to drain the area between the sea-coast and the valley of the Stour.

They all run into the sea in about the middle third of Bournemouth Bay, and differ much in length, as also in their general features which vary with the formation of the land through which they have cut their way, and this gives them their individual characteristics.

Tracing the course of each separate chine from its mouth on the sea-shore to its source inland, reference was made to the various

causes which had changed their appearance from what they were some seventy years ago. Probably the first and great cause of change took place at the period of the "Enclosures Acts" when the country around, then open moor and common land, had roads made through it and was very generally planted with pines and fir trees.

Then when attention was drawn to the district as a seaside health resort, the gradual growth of the town, with the consequent levellings for roads and buildings—and especially for drainage works, etc., have been great factors in the changes which have taken place, but perhaps greater still has been the enterprise of the land-owners, and the town's elected governors, who have secured them as open spaces for the public, and laid out, planted and embellished them in such a manner as to make up for the loss of their natural beauties and caused them to be so great an attraction in the eyes of both inhabitants and visitors.

All the chines have been more or less subjected to this alteration from their primitive state, but no one more so than the one through which the little River Bourne flows.

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**Excursions.** On May 27th, jointly with the Archæological Section, an excursion was made to St. Catherine's Hill, the chief point of interest geographically being that it is situated at the angle of the range of hills between the valleys of the Avon and the Stour.

On September 27th, another excursion in conjunction with the Archæological Section was made to Mudeford and Double Dykes to examine the Sand Bar broken by the recent storm, and notice the effect upon the movement of the tides in the harbour of Christchurch through this new outlet for the waters of the two rivers which form the estuary—one of the results being that the volume of fresher river water which reaches the sea has so attracted the salmon that the fishing season has been one of the best and most profitable for many years.

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## Geological Section.

CHAIRMAN: DR. WILLIAM T. ORD, F.G.S.

**The Nipas Fruit.** The Winter Session commenced for this section by a meeting held at the Society's Rooms on November 17th, when Sir Daniel Morris, K.C.M.G., F.L.S., read a paper on "Nipadites in Eocene Beds at Bournemouth," at which he exhibited specimens of the modern fruit, which were compared with fossil fruits from the Society's collection. This paper, with a plate, is given in full on page 78.

**Glaciation in the South of England.** At the same meeting a communication was read by the Chairman, from Alfred Grugeon, Esq., of Leytonstone (formerly Botanical Lecturer at the Bloomsbury Institute), on a subject suggested to him by the paper on Glaciation in Dorset read by Dr. Colley March in the previous year (see Trans. B'm'th Nat. Sc. Soc., Vol. II, p. 71). Mr. Grugeon stated that having seen much boulder clay and drift deposit in various localities, the farthest south he had ever detected glacial remains were at Finchley, and the Archway Road at Highgate, London. Rocks and fossils were there found that must have travelled from Derbyshire. In Epping Forest boulder clay with much chalk occurred, which had obviously been brought from a distance. He thought if anywhere glacial remains were to be found in the South of England, it would be in the neighbourhood of the New Forest, where drift might be preserved in deposits.

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**The Study of Geology.** There was no meeting of this Section held during December, but on December 17th a general lecture was given in Trinity Hall by Dr. W. T. Ord, entitled "An Address Introductory to the Study of Geology." It was illustrated by numerous lantern slides. This lecture was arranged by the Council of the Society in view of the course of six lectures on the "Science of Scenery, with special reference to the Geology of Hampshire and Dorset," to be given by the Rev. E. C. Spicer, M.A., F.G.S., of Oxford, for the University Extension Lecture Committee, early in 1911. A resumé of this lecture is given on page 32.

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**The Hampshire Coast.** On January 19th, 1911, an interesting lecture was given by H. St. Barbe, Esq., of Lymington, on the "Geological Development of the Hampshire Coast," illustrated by diagrams. This was well attended, and followed by a discussion, in which the Chairman and several members took part. The lecture is given on page 84.

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**The Science of Scenery.** For the remainder of the Winter Session, 1911, the meetings of this Section were occupied in studying the Science of Scenery, in connection with the course of six lectures on this subject given at Trinity Hall by the Rev. E. C. Spicer, M.A., F.G.S., Oxford Extension Lecturer, which many members of the Geological Section and other Sections of the Society attended. Supplementary to this course, by special request of the Committee of the Bournemouth Students' Association, Dr. Ord held a class on alternate Wednesday afternoons, at Granville Chambers, to further elucidate and explain the subject of each preceding lecture by Mr. Spicer on the "Science of Scenery." These demonstrations, which took the place of the usual meetings of the Geological Section of the Society, were also attended by

members of the Bournemouth Students' Association and others who had taken tickets for the University Extension course. The summary of points described and discussed at each class, as given below, is naturally a resumé of Mr. Spicer's lecture, and it is hoped will be of interest as a memento of this very important Course, and also as a brief outline of the principal facts upon which our knowledge of this fascinating subject is based. The books upon the subject recommended to be studied were *Marr's Science of Scenery*, *Green's Physical Geology*, and *Lubbock's Scenery of the British Isles*.

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**General Principles of the Science of Scenery.**

The first meeting of the class for this study was held by Dr. Ord on Wednesday, February 1st, at the Society's Rooms. The leading points elucidated were as follows:—Scenery is defined geologically as rock modified by certain agents. Scientifically, "rock" includes all substances composing the solid constituents of the earth's crust. There are two great agents which have modified "rock" into "scenery"—(1) earth-movements, and (2) water.

(1) *Earth-movements* occur in two directions, either *radially* to the earth's circumference, or *tangentially* to the same. These movements are rendered possible by the earth having a mobile layer underneath the crust and supporting it. Radial movements are naturally "up and down," and tangential are along the earth's surface or parallel to it. When great masses of the crust have sunk down, leaving higher portions, these latter are called "*horsts*." Some of the Continental plateaus are horsts. The ocean basins are master segments which have sunk downwards, squeezing up slightly domed-shaped continents between them. Table mountains are smaller examples of the same process, when these have not been caused by denudation. Around these masses the crust cracks, forming rift valleys, which are bounded by lines of faults.

The second, or *tangential*, form of earth movement forces portions of the crust over other portions, forming "thrust planes," which are bounded by "thrust faults," of which we have a magnificent example in the chalk cliffs of Ballard Down. These thrusts may continue to form "over-thrusts," as in the Alps, where huge mountain masses have been so produced, or they may be so small as to appear in hand specimens of rocks.

The two islands of New Zealand show remarkable examples of these forces, the North Island being a horst or continental dome. This has been squeezed up by sunken masses of the earth's crust in the ocean around it, the pressure being relieved by volcanoes in the centre of the island. The South Island is also a horst, but having no volcanoes, the pressure exerted upon it by the surrounding sunken segments has folded, faulted, and twisted its rocks into many complex forms, squeezing them up into almost Alpine mountains in the interior.

*Denudation* is the second great producer of Scenery, and acts almost entirely by water; wind may play a small part in denudation under certain conditions. Water denudes rock in three principal ways: by (1) erosion, (2) by chemical solution, and (3) by mechanical

pressure, when frozen, or by the pounding action of waves or waterfalls. The sawing back of waterfalls is an example of erosion, which only takes place when the water carries solid particles of sand, pebbles, etc. Pure water has no power of erosion, only of washing away debris. Nearly all valleys have been produced by rivers and streams. In very dry regions, as in Colorado, they tend to be deep with nearly perpendicular sides; where there is more rainfall they occur with sloping sides. The Llanberis Valley is a good example of tributary streams modifying the sides. Water not only denudes away rock, but re-deposits the material elsewhere. Rivers and streams thus tend to fill up valleys in one part, where the current is slow, whilst carving them out in higher parts, where the currents are more rapid. Along our coasts the waves act by cutting back the land horizontally, leaving what afterwards becomes a "plain of marine denudation." Hard masses of rock resist this action and remain as "stacks," such as the Old Harry, near Swanage. The sea washes softer rocks away, forming *bays*, whilst the harder rocks resist its action and remain as *headlands*.

*Denudation by Chemical Action of Water:*—This is caused by rain water becoming acid, through absorption of carbonic acid gas from the air, slowly dissolving and eating away certain rocks. Granite is decomposed in this way, and its constituents re-deposited elsewhere, the quartz as sand and the felspar as china clay. The granite Tors of Dartmoor have been carved into the present rugged forms chiefly by this agency. But limestone is the rock most easily affected by this process; the great caverns of Derbyshire, Cheddar, etc., and many of the great valleys in limestone districts have been primarily produced by the dissolving out of the lime by water, and its re-deposition often as stalactite.

*Denudation by the Mechanical Action of Water:*—This occurs in two ways: (1) by the weight of water hurled at rocks by sea waves or waterfalls, and (2) by the splitting asunder of rocks through the expansion of ice in their cracks and crevices. This occurs exactly as our water pipes burst in winter after freezing, and has been one of the most potent agents employed in carving out rock scenery.

There are two minor denuding agents which act independently of water that should be mentioned. First, expansion and contraction of rocks in countries having a very hot day, but a cold night temperature, which gradually produces splits and fissures; secondly, wind erosion in dry climates and deserts caused by sand whirled round in wind storms gradually grinding down out-standing rocks, which often assume curiously fantastic shapes. The celebrated Brimham rocks, near Harrogate, were so produced.

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**The Hampshire Basin: its Origin.**

At the second demonstration, on February 15th, this subject was considered. A "basin" is, geologically, a "sag" or depression in the earth's crust, bounded by ranges of hills or mountains. The Hampshire basin is bounded on the north by the South Downs, a range of chalk hills, and, and on the south by the Isle of Wight ridge and the Purbeck Hills, broken into by the sea in

Bournemouth Bay. To the north lies the Thames basin, to which it is very similar. Each has a river system draining it eastward, the river Thames in the northern basin, and in the Hampshire basin we find the remains of what was once a great river system in the river Frome at Wareham, Poole Harbour, and the Solent. Tributary streams in each basin flow north and south to the main river from the chalk ridges. The South Downs form the water-parting between the two. Formerly these two basins were continuous, their contents being laid down before the upheaval of the Downs divided them. In the Hampshire basin the chalk forms its floor, and dips down gently from the South Downs under the Solent to turn up again in the Isle of Wight, where it becomes nearly vertical, under the Tertiary beds which fill up the basin.

The plateau of chalk hills dividing the Thames basin from Hampshire continues to the east of the Wealden district, where it formerly formed the water-parting dividing the rivers of the Weald into north and south streams, but it has since been denuded off, leaving the Wealden strata exposed; this has since been raised up and now forms a plateau.

In the Hampshire basin most of the rivers flow southward, such as the Avon and Stour. There are a few relics of those which formerly flowed northwards in the Yar and Medina of the Isle of Wight. Southampton Water is a submerged valley, in which formerly a river flowed southward to the old river Solent, as the original great river of geological times has been called. This once formed a river system corresponding to that of the Thames and its tributaries in the northern basin.

The Hampshire basin was formed by great earth movements, which occurred in comparatively recent geological times. To understand these movements we must remember that the centre of the earth is rigid, and twice as solid as a globe of steel. Earth waves travel round the crust. As the earth cools it contracts, and the crust has to wrinkle up to adjust itself to the diminished volume of the interior. The lower portion of the crust consists of ancient rocks, such as granite, gneiss, etc., under intense pressure. These do not split or fracture, but *flow*, being very slowly compelled to this by the enormous pressure of rocks above them. But the more superficial stratified rocks, which cover them, and are far less rigid, have to slide and slip and ride over one another. The chalk floor of the basin was deposited very slowly in a sea which subsequently became dry land, and on which—after some erosion—the Tertiary beds were laid down. At the close of this period an enormous outburst of volcanic activity occurred in many parts of the globe, especially in the West of Scotland and North of Ireland, where the remains of vast lava fields occur, which are now over 3,000 feet thick in places, and formerly must have been of even greater depth. It was probably the extrusion of this enormous quantity of molten rock which reduced the pressure and support of the earth's crust in the South of England, and so caused the sag in the surface which we now recognise as the Hampshire basin. Similar earth movements have occurred many times in geological

periods, and in each district the direction of the sag produced by them seems to have been the same at each period. Thus, in South Wales, and the South of England, from Devon to Kent, the trend is east and west; in the Pennines, north and south; in the Mendips, east and west; at Charnwood Forest, north-west and south-east.

The origin of the Hampshire basin must therefore be referred to crust movements, caused by a diminution of pressure, produced by the great lava outbursts which closed the Tertiary period.

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**The Structure of the Hampshire Basin.**

Continuing the subject on March 1st, the structure of the Hampshire basin was considered. The oldest rocks were found in Wales and the South-west of England, whilst on travelling eastward newer and newer rocks were passed over, the most recent of all being in the Isle of Wight. Only one more recent formation occurred in Norfolk. These older rocks formed the floor of the basin, which was like a spoon filled with chalk, gravel, sand, and mud. The floor of the basin was sagged downwards and its surface eroded. If one stripped off the chalk which lined the basin, underneath we should find Wealden beds; if these were removed Jurassic would appear, and so on, until after removing many different layers of strata we came to the old Archæan rocks, which formed the foundation of the earth's crust. The Hampshire basin was lined by chalk, which appeared in its northern and southern boundaries as the South Downs and the ridge of the Isle of Wight and the Purbeck Hills. The Tertiary beds which filled the basin were very soft, and consisted largely of sand, gravel, and mud. Hence the basin has been much cut up and broken by streams, far more so than the Thames basin. Various chines, inlets of seas, estuaries of rivers, etc., mark the Hampshire coast, the existing scenery being what has escaped the denuding influences of water since the contents of the basin were deposited. The many layers of strata deposited in the basin since the chalk was raised up from the sea are the results of several raisings and depressions of the surface above and below sea level. Some beds have been partly washed away, and others deposited in their place. Each time the floor sank it was covered with fresh material by sea or rivers and streams. Each time it rose it was eroded and partly dissected out by atmospheric agents—chiefly water. At present we live in a "continental" phase, when atmospheric denudation is taking place, the surface being raised above sea level.

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**The Hampshire Basin: its Contents.**

This subject was dealt with on Wednesday, March 15th. The preceding lecture was not delivered by Mr. Spicer owing to illness, and Dr. Ord had been invited by the University Extension authorities to deliver the lecture on "The Contents of the Hampshire Basin," in Mr. Spicer's place. In so doing, Dr. Ord made use—by kind permission of the Council—of a series of slides prepared for two

lectures on the "Geology of the Bournemouth Cliffs," which he gave before the members of this Society on March 14th and 21st, 1908, and which are now in the Society's collection at Granville Chambers.

The Hampshire basin might be regarded as a spoon, the floor and sides of which were of chalk, and its contents gravel, sand, and mud, variously arranged and deposited at different times. The agent which had laid down these contents had been a mighty river, as large as the Ganges or Mississippi, of which all that remained was now the little river Frome that flowed into Poole Harbour at Wareham, and the Solent, which at one time had formed the mouth of the river. Walking along the shores of Bournemouth Bay from beyond Studland to Hengistbury Head, we passed a magnificent section of the older contents of the Hampshire basin. The oldest beds were those which lay directly on the chalk, and were known as the Woolwich and Reading beds. These were seen resting upon the chalk beyond Studland. Next came the London clay, near the same spot, and upon that again the Bagshot sands. These last extended from Studland Bay to near Hengistbury Head. They could be easily studied, as owing to their not lying quite horizontally. but "dipping," as geologists say, very slightly to the south-east, each bed, as one walked along the shore, came gradually into view. These various strata all showed unmistakable evidences of the manner of their deposition. Gravel composed of chalk flints told of chalk strata denuded away and hard flints washing about in river beds or on the sea shore, and then being laid down as beds of gravel or shingle. Sand deposited in layers or irregularly told of a river mouth where sandbanks were formed or of the quieter waters beyond the bar where the sand could sink to the bottom in beds. Layers and pockets of clay spoke of quiet reaches, pools, and back-waters by the river banks, and where flood waters occasionally extended, in the still pools of which the fine ooze held in solution could sink gradually, forming beds of clay.

But there was another and more certain method of ascertaining the conditions under which such deposits were laid down, and that was by their fossil contents. The beautiful leaves and fossil fruits, so well known in Bournemouth, have been preserved in the clay beds as described. Trunks of coniferous trees and masses of teredo-bored wood are frequently found in the sandy beds. In later times the climate changed; the sea broke in, and the lovely fossil shells of the Barton clay left their remains in beds above the Bagshot sands in the eastern part of the basin. The floor of the basin was gradually raised up in later times, when the Oligocene beds were deposited, and after that the great earth movements set in which raised up the chalk edges of the basin and formed the hills bounding it north and south. The last great event in geological history was the destruction of the southern boundary of the basin by the breaking in of the sea through the chalk ridge which formerly extended from the Needles to the Old Harry Rocks.

Finally, we may ask from whence was the material derived which now fills the basin? The flints came, as stated before, from

the chalk, but the china clay and the sand is believed to have been derived from the disintegration of granite. The ancient Solent river drained a vast extent of granite country to the west, of which Dartmoor, Cornwall, and the Scilly Islands are all that now remain. As the granite decomposed, its felspar formed fine white mud, which has been left in beds of china clay, whilst the quartz disintegrated into sand of various degrees of fineness. Thus has the scenery we now enjoy in our cliffs, the Purbeck Hills, and the beautiful bays and harbours of South Hampshire, Dorset, and the Isle of Wight, been gradually built up and carved out by the same forces of Nature now working around us.

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**Chalk Scenery** On March 29th, Dr. Ord discussed Mr. Spicer's lecture on Chalk Scenery. This meeting was of special interest, because the views held by the learned lecturer on this subject were explained as being in advance of those usually accepted by geologists, though they are gaining ground, and in his (Dr. Ord's) opinion were undoubtedly the correct ones. This arose from the fact that the type of scenery peculiar to chalk is quite different from that produced by other formations, its nearest analogue being that of limestone districts. There are splendid examples of chalk scenery in the Isle of Wight, Purbeck Hills, and the Wiltshire Downs. The chief characteristics are: (1) greatly rounded hill contours; (2) the valleys are sudden, steep, begin abruptly, and are mostly dry, and tend to turn suddenly, sometimes at right angles; (3) "cirques" or "arm-chairs" head many valleys; (4) swallow holes are found in them, sudden copious springs show extensive underground drainage, although the valleys themselves are dry. These features are very different from the wide, open valleys found in clays, sands and gravel, with their bottom streams gracefully curving and meandering, with gently sloping origins and surface drainage, and also from the steep gullies and torrents of mountainous districts amidst hard, insoluble rocks. The explanation of this difference is found in two factors: (1) the solubility of chalk in rain water containing carbonic acid in solution, and (2) the porous nature of chalk, enabling it to hold water in its pores like a sponge. In these respects there is a close resemblance between the behaviour of chalk and limestone, except that the latter is not porous, but both tend to allow water to flow and escape by fissures and joint planes; whilst the issuing of streams from the chalk at similar levels is due to the lower portions being saturated with water and unable to hold the further supplies that soak through to them from above. It is to the solubility of chalk in rain water that the rounded contour of chalk hills and the "cirque" or "arm-chair" shape of its valley heads is due.

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**Coast Scenery.** The concluding class of the series was held on Wednesday, April 12th, on Coast Scenery. There are three factors in the formation of coast scenery: (1) the material —as regards hardness or softness, etc.; (2) the way the rocks

formed of this material are arranged; and (3) the agents used in modifying the rocks, namely—sea, atmosphere, and rain. A glance at a geological map of the South Coast shows that along Dorset an encircling band of hard Jurassic rocks surrounds and protects the softer younger rocks, curving to the south-west. Hence stand out the promontories of Portland, the Isle of Purbeck, etc.; whilst where this has been destroyed the sea has eaten the coast into bays, as at Weymouth, Swanage, Lulworth, etc. Similarly, the chalk surrounded the younger Tertiary beds of the Hampshire basin, until the sea broke through into Bournemouth Bay and partially washed them out. The harder rocks stand out as headlands at Portland, St. Aldhelm's Head. Peveril Point, Ballard Downs, the Needles, etc. Whilst the sea is chiefly responsible for carving out coast scenery, land streams assist by forming coastal valleys and washing out debris. Ice also helps in winter by forming in fissures and then splitting off masses of rock from high up on the cliffs; whilst in limestone and chalk strata the lime is dissolved by rain water and fissures formed. Similarly, joint planes are widened, and so all contribute to the action of the waves in forming our shore scenery by breaking down the cliffs, carving out bays, leaving headlands, and so on.

Coast erosion is largely determined by the folds of the strata, the direction in which the beds tend to split up, and the joints into which rocky cliffs divide. The position of these, relative to the direction of wave force, is very important. Horizontal lines of stratification with large joints in chalk and limestone tend to form stacks and pinnacles, as at Old Harry Rocks, the Needles, and Duncansby Head. Earth movements influence coast scenery by producing bedding-planes in the rocks, along which they split very easily. Where the strata have been much compressed and contorted by earth movements, great irregularity of rock scenery results. This may be seen at Durdle Door and Stair Hole, near Lulworth, as well as in the rocks guarding the entrance to Lulworth Cove.

The opposite of these effects is seen in the coast lines of softer material, when we get wide, low harbours, and beaches protected by sand and mud banks. These are seen in Poole Harbour and Bournemouth Bays.

At the close of this demonstration a hearty vote of thanks was given to Dr. Ord for conducting the classes, which had proved of great interest and were well attended by many who heard Mr. Spicer's lectures, as well as members of the Natural Science Society. The classes were of an informal nature; questions were freely asked, and some interesting discussions took place on points of difficulty. This concluded the work of the Geological Section for the Winter Session.

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**Excursion to Compton Bay.**

The first geological excursion of the Summer Session, 1911, was arranged in conjunction with the Botanical Section on Wednesday, May 3rd. Owing to a gale, the steamer did not go, and the few members—

about a dozen—who braved the elements went by train to Lymington, crossing thence to Yarmouth. Mr. G. Colenutt, F.G.S., of Ryde, had arranged to meet the party there, but as he was unable to come, Dr. Ord conducted the excursion. Mr. Colenutt kindly sent some diagrams illustrating the arrangement of strata in the cliffs, which were distributed to members and proved a useful guide. Driving to Freshwater and thence along the military road to a point over Compton Bay, the path to the beach was descended. The junction of the Chalk and Greensand was observed, and the Chairman gave some account of the geology of that portion of the coast. Owing to the very high tide and gale, it was impossible to proceed any distance along the beach, and the intended visit to Brook and the submerged forest had to be abandoned. A few fossils from the chalk were obtained.

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**Excursion to Durlston Bay.** The Oxford University Extension Lecturer, the Rev. E. C. Spicer, M.A., F.G.S., had intended arranging a geological excursion, to which all who had attended his lectures on the "Science of Scenery" should be invited. As he was unfortunately unable to arrange this, Dr. Ord was asked to conduct one or two excursions to illustrate by nature study the principles so ably set forth in the lecture-course. At the request of the Bournemouth Students' Association, this was arranged, in conjunction with the Geological Section of the Bournemouth Natural Science Society. To this all others who had attended the preceding lectures and classes were also invited, the combined excursion being conducted by Dr. Ord to Durlston Bay on May 10th, 1911. Some forty members and friends attended the excursion, which was a great success and proved of much interest.

Leaving Bournemouth Pier by the 11.45 a.m. boat for Swanage, the great Purbeck thrust fault in the cliffs at Ballard Down was observed *en route*, and after landing at Swanage Pier the party walked to Peveril Point, where lunch was enjoyed on the grassy slopes. After this Dr. Ord gave an address on the coast scenery around them, pointing out their position relatively to the Hampshire basin, the chalk ridge of the Purbeck Hills, a few miles to the north, forming the southern boundary of the basin in its western extension. The special features of the Purbeck beds, which they were about to examine, were then described, and illustrated by reference to a large diagram. After this address, which was listened to with much interest and attention, Dr. Ord took the party down the steps to the beach. The first objects noted were the two reefs of Upper Purbeck rocks (the celebrated pink and grey *Paludina* marble) stretching out to sea, and the curious double anticlinal fold, which has enabled them to resist wave-action. Next the *Unio* beds were found, also the curious layer of vertical lime crystals known as *beef*. Further along the *Mammal bed* was pointed out, which had yielded—in another part of the cliff—some remains of one of the earliest known mammals, a little marsupial, about the size of a rat. The *Cinder bed*, a real fossil oyster bed, excited much interest. Two small faults were noted and explained, and

some fine illustrations of the erosion of coast scenery by the sea were pointed out. The excursion terminated at the Zig-zag, whence members dispersed for tea and the return boats for Bournemouth.

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**Excursion to Alum Bay.**

The second of the combined excursions in connection with the recent O.U.E. Lecture Course and the Geological Section of the Society was conducted by Dr. Ord on Saturday, June 17th, to Alum Bay. The threatening weather, and dread of a rough passage to the Island, deterred many from joining this excursion, which nevertheless proved most enjoyable and the weather perfect. Arriving by the s.s. Majestic at Alum Bay at 11.30, the party walked to the south-westerly corner of the bay, where the junction of the Chalk and Tertiary strata is so well seen. The Chairman then gave an account of the geological features of the cliffs, beneath which the party were seated. It needed no geologist to distinguish the three great series of strata within sight: first, the lofty chalk cliffs, the beds of which were tilted up at a high angle; next, the many coloured Tertiary beds, comprising the Woolwich and Reading, lying on an eroded surface of the Upper Chalk, also London clay, containing septarian nodules with a few shells, but otherwise unfossiliferous in this district; then the Bagshot series, followed by the Barton clay. The third division commenced at the pier and formed the grassy slopes of Headon Hill; they were the Oligocene beds, peculiar to the Island and the adjacent Hampshire coast. These beds were unknown to exist in any other part of England until, a few years ago, the late Mr. Huddleston discovered that the well known hill, Creech Barrow, near Wareham, was chiefly built up of Oligocene strata. This showed that these beds had originally a more extensive range than geologists had supposed, but they had since been removed by denudation. After a picnic lunch, the various rocks in succession were examined. Fragments of leaves were found in the Bagshot beds corresponding to the Bournemouth leaf beds, masses of iron-stone of the same horizon as those of Hengistbury Head, and the celebrated Nummulites bed of the Barton clay. Little time now remained for study of the Oligocene, but Headon Hill was climbed, and the Plateau gravel capping its summit, Bembridge limestone, and the Osborn beds were observed, after which the party returned by steamer to Bournemouth.

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**St. Aldhelm's Head and the Dorset Coast.**

The fourth excursion of the Geological Section took place on July 12th, under Dr. Ord's guidance, some twenty-six members attending. Taking train to Corfe Castle, members drove first to Blashenwell, where the interesting tufa deposit was examined, with its neolithic interments and traces of human occupation found in what was once the bed of a prehistoric lake, in which the deposit of lime had taken place. The curious miniature caves, lined by stalagmite, caused by water percolating through and dissolving the

lime, were pointed out, showing on a small scale the method by which the great caverns of Derbyshire, Cheddar, and other limestone districts, have been formed. A careful search of debris brought to light fragments of bone, oyster shells, flint flakes, charcoal, and other evidences of human occupation. After passing through Kingston and Worth Matravers, the brakes were left, and a short walk over breezy downs brought the party to St. Aldhelm's Head. Here, under the shade of the little Norman chapel, lunch was enjoyed, and the Director gave an account of the geological structure of the great cliff, on the chief headland of which they were seated, concluding with a brief reference to the history and archæology of the ancient building which for so many centuries had stood upon it. By the aid of a large coloured diagram, which depicted a section of the strata from the Head, through Corfe, to Wareham, it was shown that the cliff, formed chiefly of Portland and Kimmeridge strata, was part of a great monocline or upheaval of the strata which had pushed the beds into a dome-shaped mass, on part of which they stood, whilst most of the southern portion had now been carried away by the sea. To the north, below Kingston, lay a trough of Wealden strata, this again being bounded by the Greensand and Chalk, which had also been forced up into the ridge of hills which traversed the Isle of Purbeck. Beyond these were the Tertiary sands, clays and gravels of the Hampshire basin—or at least its Dorset extension westwards—which formed the heathlands around Wareham and Poole Harbour. Owing to the intense heat of the day, some of the party thought it best to avoid the long coast walk to Swanage, but the majority started off, under Dr. Ord's guidance, following the coastguard path. At Winspit Quarry the relationship of the various beds of the Portland strata was well shown and explained by the conductor. The cliffs at Seacombe and Dancing Ledge were also visited, and Portland fossils were found. As the walk proceeded, the heat seemed to increase and the party became scattered, but all finally arrived safely at Durlston Head, where tea was obtained, and the return from Swanage by boat or train completed a very interesting, though unusually fatiguing, geological outing.

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**Excursion to Becton Bunny.** On August 16th, Mr. H. St. Barbe, of Lymington, conducted a very interesting excursion to Becton Bunny and Hordle Cliffs. On arriving at the foot of the cliffs each member was given a diagram showing the course of the Bunny and the geological features of the district. Mr. St. Barbe explained the junction of the highest beds of the Eocene—the Barton and the Headon beds, which were the lowest of the Oligocene series. The succession of strata revealed a gradual passage from marine conditions, at some distance from a shore, through the shoals and advancing delta of a great tidal river, up to the purely fresh water inland reaches, which had been here and there dammed into lakes or lagoons fed by the same stream. This probably implied a slow continental upheaval, prevailing over the

whole of North-western Europe, during the succeeding Miocene age.

The beds were then examined in their ascending order to the eastward, the line of the coast being only slightly oblique to the general north-easterly dip of the whole series. The chief beds of the Upper Barton and Lower Headon were examined, and the "crocodile" bed defined, though only one small fragment of bone could be discovered. The curiously interrupted bedding west of Long Mead End was noted and its significance, as indicating probably an old stream bed once tributary of a former river of Headon times, was explained by the conductor. The presence of some ancient earth-works, possibly Roman or earlier, and the name "Taddiford," applied to the dip in the road where no water is now found, suggested the existence of a stream down to prehistoric times, which had since been cut off by the encroachments of the sea. The party returned for tea to Milton, where a hearty vote of thanks was passed to Mr. St. Barbe for an interesting and instructive day.

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**Flowers Barrow and Worbarrow Bay.**

This general excursion was to have been largely of geological interest, and was attempted by a large party on September 9th, but as on the similar occasion in September, 1910, rain fell in torrents as soon as East Lulworth was reached, and the long walk over the exposed Dorset hills was given up as impracticable, to the great disappointment of some sixty members and friends.

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**The Geological Collection.**

Important contributions of fossils have been made during the year to the Society's Geological collection by several friends, especially Mr. Sherring, Dr. Ord, Dr. Norman of Bath, and a large general collection of many hundred specimens from the late Dr. Nicholson of Bristol. The thanks of the Society are due to these generous donors. Unfortunately owing to the lack of space and the need of show-cases or cabinets, no progress has been made in arranging the collection. It is hoped that a larger room may be obtained shortly, and that this important work may not be longer delayed.

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## Microscopical and Zoological Section.

CHAIRMEN: H. B. WELLS, ESQ., AND DR. CRALLAN.

The Zoological Section sustained two great losses since the last Annual Meeting by the death of Dr. Thomas, one of its chairmen, and by the departure of Dr. Dixon from Bournemouth. A special notice of the former is given on page 14. The loss of Dr. Dixon's help, particularly in the Microscopical department, has been greatly felt. Dr. Crallan was chosen to act as chairman with Mr. Wells, in place of Dr. Thomas.

The first meeting was held on November 24th, 1910, when a paper on "Protective Colouration in Man" was read by J. Omer Cooper, Esq., his argument being that protective colouring was much more developed in savage and uncivilized races, who exist by the chase, and who are hunters of necessity, than in those countries that had been for centuries inhabited by civilized people who live by agriculture and pastoral pursuits. Also the former, as a rule, inhabit woods and forests, and wore few clothes, and hence a dark skin better enabled them to approach their prey, and avoid their enemies. In the case of animals this has long been known and recognised, and he thought the same reasoning would apply also to the human race.

At the December meeting Dr. Dixon kindly gave a demonstration of Section-Cutting with the Cambridge Rocking Microtome presented to him by the Bournemouth Natural Science Society. He first explained the process of embedding the organisms in paraffin, and then the working of the various parts of the Microtome and the method by which all sections cut were delivered in the exact order in which they were cut. He then produced some marine organisms which had been previously embedded in paraffin and proceeded to cut sections. These, after being placed on glass slips and the paraffin dissolved out, were handed round for examination and after being much admired, were divided amongst the members present.

At a Sectional meeting held in January 1911, an address on "Snakes" was given by Mr. Rohu, who exhibited living and preserved examples.

In February there was no meeting, owing to the illness and death of the late Dr. Thomas.

On March 16th, at a Sectional meeting an address was given by Mr. Joseph Neale, on "The Origin and Significance of certain Colours and Markings on the larvæ of the Puss Moth and others."

Emphasis was laid on the advantages accruing from the study of caterpillars in their natural surroundings, large drawings of some of the more showy larvæ easily obtained in the Bournemouth district being shown. Mr. Neale drew attention to the heavy death-rate implied by the large number of eggs laid by the parent moths, and inferred the rising value of each successive stage in larval life, viewed from the point of view of race survival. In accordance with the greater value of the growing caterpillar, coincident with the greater risk of detection with increasing size, it was noted that a caterpillar showing a simple colour pattern when first hatched developed at each moult markings resulting in a highly complicated pattern in the last stage. Not only does a relation subsist between the larval colour pattern and its environment, but these are related to the position and resting attitude of the caterpillar, e.g., the fantastic "Puss," easily found in summer on poplar, was noted in its earlier stages as resting during the day in full view centrally on top of a leaf, its colour pattern simulating successively: (1) a streak of dead leaf tissue, black; (2) the same, or a bud scale fallen from above and resting on a leaf, black with touches of russet; (3) an irregular area of dead leaf tissue bordered with dying, and this with

healthy tissue, a pattern of concentric dark, yellow, and green ; and in its last larval stage, when its greater weight necessitates a hanging position, the pattern becomes more complicated, simulating leaves in light and shade, in profile, or fore shortened, their edges picked out in white colour for the high lights with darker shadow in immediate proximity for contrast, with other details of colour to match the depths of shade in the interior of the food plant, and other areas suggestive of foliage in full sunshine.

The larvæ of the Poplar Hawk moth, the Eyed Hawk moth and Privet Hawk moth were also shown. The two former of these vary in tone to match the special foliage on which they feed—light blue-green specimens tone with leafage in shade or seen by reflected light ; yellower ones simulate leafage seen by transmitted sunlight ; the minutely yellow, or white, stippled skin of the larvæ simulates the cell structure of the leaf, and diagonal lighter and darker tones mimic the leaf surface broken by veins with light and shade accurately related. In the Eyed Hawk and Privet Hawk larvæ, to these breakings up of the surface, is superadded change of ground colour, the under-side in the characteristic attitude assumed by the caterpillar being lightened to kill the shadow cast by the solid body, giving at a short distance the effect of plane leaf surface rather than of solidity. In the larvæ of the "Swallow Prominent," this device is further supplemented by a shiny skin, which takes reflections of green from its surroundings.

Brief reference was then made to caterpillars needing no concealment, unpalatable by their urticating hairs, as the "tigers," the "fox" moth, and "vapourer" ; and to the uneatable sociable caterpillars, such as those of the "buff-tip" moth, which pool their inedibility to the common advantage, and further advertise it by a colouration strongly suggesting a nest of wasps. Best protected of all seem to be the evil-smelling larvæ of the "goat" moth, with their warning red colour. Considerable discussion followed the address, and the conclusion of the lecturer was fully endorsed that no serious study of the colour problem in Nature can be made except in the open field, that it is imperative to follow the life history of insects in their unspoiled natural surroundings. At the same meeting Mr. W. Parkinson Curtis exhibited a Syntomid moth, Psilopleura hæmasoma D. Jones, of which there is not as yet a published description. He gave a description of the insect, and showed drawings and microscope slides illustrating its characters. He also explained the characters of the family Syntomidæ, and the genus Psilopleura, and by means of diagrams on the blackboard illustrated the evolution of the particular type of wing-neuration found in the insect exhibited.

Mr. Curtis's paper will be found in full with coloured plate on page 95.

Sectional meeting, April 27th. A paper was read by H. J. Waddington, Esq., F.L.S. It was kindly prepared by Miss Pierce, of Bournemouth, and entitled, "Notes on Forest and other biting Flies." The subject was illustrated by a special series of lantern slides.

The following excursions took place:—

May 27th. To Oak Avenue and Jumper's Ponds.

June 14th. To Hatchett's Pond, between Beaulieu and Lyndhurst. At each of these excursions several interesting specimens were obtained.

July 1st. To the Salterns, Parkstone, where it was hoped that members might observe the numerous birds usually to be seen on the marshes, but unfortunately some mischievous boys had drawn the sluice-hatch the day before and let in the flood tide, which turned the marsh into a lake. This also prevented any hunting in the marsh pools, so that searching for organisms was practically confined to the piles of the Salterns Pier, where some interesting specimens were found. The party then adjourned to the neighbouring residence of Dr. Crallan (Chairman of the Zoological Section) for tea. Afterwards the party inspected part of Dr. Crallan's collection of Lepidoptera.

There was no excursion in August owing to the drought.

In September a dredging excursion in Poole Harbour was proposed, but fell through owing to inclement weather.

The following specimens of interest have been collected during the summer:—

Lepidoptera—A fine and unusually symmetrical albino variety of Epinephele janira (a female).

A well-marked aberration of Chrysophanus phlœas, the left fore-wing being silvery white, as in the well-known var. schmidti.

A female Lycæna bellargus (adonis), in which the usual ocellated spots are entirely absent on the under side.

Pisces—A specimen of the ten-spined stickleback, Gasterosteus pungitius, a somewhat rare fish.

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## Photographical Section.

CHAIRMAN: E. W. BARLOW, ESQ., F.R.A.S.

**Photography. Its Aims and Methods.**

At the opening meeting of the Session on December 1st, 1910, a lecture with this title was given by the Chairman. A condensation of the greater part of this paper is printed on p. 99; the remainder consisted in a more detailed explanation of the difference between the two kinds of photography, each branch, portraiture, architecture, landscape, etc., being considered in turn. The lecture was illustrated by photographs from the current photographic journals, which were handed round.

**Colour Photography.**

On February 11th, 1911, an extremely interesting lecture on "Colour Photography" was given to what was perhaps a record sectional audience (85) by G. G. Hamilton, Esq., F.R.C.S. The lecturer gave an exposition

of the modern one-plate tricolour screen photography, as represented by the Lumière Autochrome plate, the Dufay and the Thames plates; the two former are French and the latter an English make. The method of taking the photograph, which is comparatively simple, provided the correct exposure be ascertained, was described, and the whole illustrated by a large number of beautiful examples taken by Mr. and Mrs. Hamilton. These covered a great range of subjects:—(*a*) Shewing the value of colour photographs as scientific records of pathological conditions. The lecturer dwelt on their advantage over more or less inaccurate drawings and the ordinary photograph with no colour differentiation at all. (*b*) Microscopical. Some very good preparations were copied with great fidelity. (*c*) Glass and China, (*d*) Flowers, (*e*) Butterflies, Moths, etc., (*f*) Pictures and Portraits. The lantern was admirably managed by Mrs. Hamilton.

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**The Lantern Slide as a Means of Photographic Expression.**

On March 4th, 1911, R. Y. Banks, Esq., gave a lecture, entitled "The Lantern Slide as a means of Photographic Expression," divided into two chief parts: (1) the making of a lantern slide; (2) the colouring of a lantern slide. Seventy illustrative slides had been prepared by Mr. Banks, all of them excellent save a few specially made to illustrate defects and pitfalls which were, of course, also excellent for their purpose. The lecturer expressed the opinion that the reduction method of making slides was preferable to the contact process. Formulæ and detailed instructions were given for what is really by no means a difficult printing process. In the second part a short history of the attempt to obtain photographs in colour was described. This can now be done in the case of transparencies, though paper prints cannot be made (*see* account of last lecture). But many pleasing monochrome colours can be obtained by toning, tinting by hand, etc., which add much to the beauty and variety of the pictures. In the case of lantern slides there are three ways of doing this:—(1) By a general staining with suitable dye, (2) by toning during development, (3) By toning, after development, the ordinary black and white slide. Examples by each method were shown. (1) can be extended by the application of dyes of different colour to various portions of the slide, and some good examples thus tinted by means of the Velox Transparent Water Colour Stamps were exhibited.

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**Excursion to Fordingbridge, etc.**

On April 26th, 1911, a small party went by train to Fordingbridge and drove thence to the village of South Damerham. After taking some photographs of the old church etc., they proceeded over the open downs to the unfrequented village of Martin. Owing to the beautiful weather the drive was very enjoyable. After tea at Fordingbridge the return to Bournemouth was made.

**Excursions to Netley Abbey and Wimborne.** On June 28th, 1911, a combined Archæological and Photographical excursion proceeded to Netley Abbey and had an excellent day. That arranged for Wimborne on August 19th, was postponed on account of the uncertainty of the railway strike and the small attendance promised.

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**Excursion to Witchampton and Knowlton.** On September 9th, 1911, a most successful and very enjoyable Archæological and Photographical excursion to Witchampton and Knowlton was attended by some 30 members. On arriving by train at Wimborne in the morning they were driven to Witchampton, one of the most beautiful villages in England. Mr. Brownen read some interesting notes in the church and later on the drive was continued to Knowlton, distant 10 miles from Wimborne. Here objects of photographical and archæological interest were found in the little ruined church lying centrally in a large circular earthwork. Mr. Brownen again gave an address on the history of the place and a return was made to a very pleasant tea at the Horton Inn. The drive back to Wimborne and train journey thence completed the excursion, which was favoured with excellent weather.

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**The Portfolio.** This has circulated throughout the summer. Fresh members will be welcomed. A charge of 1/- per annum is made to cover expenses, and particulars may be had on application to E. W. Barlow, Esq., Ditton Lodge, Stourwood, Bournemouth.

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## Physical Section.

CHAIRMAN: HUBERT PAINTER, ESQ., B.SC. F.C.S.

The activity of this Section was well maintained during the Society's year 1910-1911. Two sectional excursions took place and five meetings were held at the Society's Rooms. At these meetings seven distinct papers were read.

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**Excursion to Totton.** A small party went to Totton on Thursday, December 8th, to visit the Sulphuric Acid Works of Messrs. Spooner and Bailey, Ltd., and the Tar Works of Messrs. Burt, Boulton and Heywood, Ltd.

The first visit was to the Sulphuric Acid Works, over which the party was conducted by Mr. Wainwright, the manager. After inspecting samples of the pyrites and other materials used, the visitors were shown the pyrites burners, the "nitre oven," the "Glover tower," the great "leaden chambers," the "Gay-Lussac tower" and the "still house." The whole process was seen in action and full explanations were given by the manager. A specially

interesting operation was that of the removal of the arsenic from such portions of the output of crude oil of vitriol as were to be converted into pure sulphuric acid. This is effected by means of sulphuretted hydrogen. There is no commercial use for the great masses of yellow sulphide of arsenic which result. After an interval for lunch, the party proceeded to the Tar Works, and saw the settling tanks into which the tar is put as it is received from the gasworks. The solid part, the pitch, is made into briquettes for fuel, the liquid portion is distilled fractionally from large iron stills, the various distillates yielding creosote, napthalene, anthracene, etc. The tar as originally received contains a certain amount of gas liquor, and this is worked up for ammonium sulphate, of which salt the firm produces about 200 tons annually. Throughout the day the weather was exceedingly inclement, but those members of the Section who defied the rain and wind were rewarded by a most instructive and interesting outing.

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**Weather Forecasts.**

There was a good attendance of members of the Section to hear the lecture delivered by F. I. Cooke, Esq., on Saturday, February 4th. The full title of the lecture was "Weather Forecasts and the laws which determine them." After a short introductory speech by the Chairman, Mr. Cooke explained the origin of the word "meteorology" and the scope of the science, and then proceeded to the special branch with which he had to deal. The following is a brief abstract of his remarks :—

The barometer is by far the most important of the instruments used ; the imperfect and misleading wheel barometer is not, however, employed by scientific meteorologists. The direct readings have to be corrected in various ways and the results are telegraphed to the Central Office. The officials use these for the construction of weather charts. Lines are drawn through places where the barometer readings are equal and thus series of isobars are marked. The chart thus constructed gives reliable information concerning the direction and force of the wind in different parts of the area to which it refers. Everywhere and always in this hemisphere if we stand with our backs to the wind the barometer is lower to our left hand than to our right. This is a statement of the law of Buys Ballot, a generalisation of the highest importance. The diagrams (shown on the screen by the lecturer) exhibited the different arrangements of isobars and made clear what is meant by the barometric gradient. The most important of the varities of isobaric systems are the cyclone and the anti-cyclone. In the former the gradient runs down toward the centre and in the latter it runs up from the centre. In many respects these two are antitheses of each other. Amongst other types of isobars connected with or derived from the two principal kinds are the Secondary, the V depression, the Wedge, the Col, and the straight isobars.

From the chart with its isobars conclusions can be drawn as to the direction and force of winds and also as to temperature, rainfall,

sunshine, etc. Concerning the origin of the complicated and ever-changing system of atmospheric phenomena much has yet to be learned, but the circulation set up by the unequal heating of the atmosphere by the sun and modified by the earth's axial rotation is doubtless the chief factor. Our peculiar English weather is largely dependent on the fact that these islands lie in the favourite track of cyclones. Besides the indications of the barometer other means of forecasting weather are of some importance, for example, the careful study of cloud-forms and cloud-movements.

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**Observational Astronomy.** A lecture having this title was given on February 23rd, by E. W. Barlow, Esq., F.R.A.S. The lecturer began with the statement that in spite of the multiplication of large telescopes and of observatories with elaborate accessories, good and useful work could still be done by amateurs with small instruments and even with no instruments at all.

The advantages of the reflecting and refracting forms of telescope were briefly summarised, a few remarks made on the fitting up of small observatories, and advice was given as to the magnifying powers to be used for different kinds of work. Various accessories to the telescope were shown and their use explained, such as (1) the Barlow lens, (2) the star diagonal, (3) the sun diagonal, (4) the Zollner spectroscope. The lecturer showed on the screen a number of photographs and diagrams, most of which were his own work. Three excellent diagrams illustrated the "scale of the degree," the "scale of the minute," and "the scale of the second" respectively. Some interesting and valuable suggestions were made as to the various classes of astronomical work open to the amateur, and at the conclusion of the lecture Mr. Barlow exhibited some fine drawings of Halley's Comet, the Daylight Comet of 1910 and the phenomena of Jupiter's satellites.

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**Radio-telegraphy.** On March 18th, Percival J. Parmiter, Esq., lectured on "The Principles of Radio-telegraphy." A number of lantern-slides were shown on the screen and one or two interesting experiments were performed. A brief description was given of the various types of high-tension sparks which can be produced and the construction and method of employment of the Marconi coil were thoroughly explained. Various forms of spark-gap apparatus were passed under review, full details being given in the case of some of the more important. The lecturer also gave the history of the "Coherer," and of certain other appliances used either in the reception or transmission of signals and succeeded in giving as full and clear an account of an interesting but somewhat difficult subject as was possible within the limits of a single lecture.

**Photometry.** A meeting of the Section was held on April 22nd, at which two papers were read. First, Mr. Percival J. Parmiter exhibited specimens of the products of the "Solidified Petrol Company Limited," gave a brief account of the process of preparation and explained and illustrated some of the uses for which they are designed. Next followed a lecture by W. Temple Gardner, Esq., F.C.S., entitled "Photometry, or the Measurement of Light." The lecturer began by giving a few definitions and a summary statement of certain principles and then exhibited a photometer such as is in general use in this country. The principal parts of this were pointed out and specimens of the standard candles, as defined by Act of Parliament, were shown. Another interesting exhibit was the Vernon Harcourt Pentane Standard which is the equivalent of 10 standard candles. The history of photometry was sketched and the evolution traced of the apparatus employed from the crude appliances of Rumford to the elaborate and delicate instruments in present day use. Some interesting statistics were given and, at the end of the lecture, various photometric measurements were taken, including the candle-powers of an electric lamp and of a gas-burner with incandescent mantle.

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**Graphs and Gases.** The Chairman read two papers at the meeting held on June 10th. The first was entitled "The Graphic Solution of Problems relating to the Laws of Boyle and Charles"; a report of this appears on another page of this volume.

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**Chemistry in Chaucer.** The second paper was on Chaucer's "Chanoun's Yemanne's Tale" as illustrating the chemistry of the 14th century. A sketch was given of the story and attention was directed to the lists of chemicals mentioned, to the various kinds of apparatus whose names occur, and to the processes that were employed by the Canon. An account followed of the alchemical experiments performed by the Canon with their disastrous results and the ingenious excuses for failure assigned by the experimenter. The hypotheses which were current at the time were briefly explained and Chaucer's own attitude towards alchemy was discussed.

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**Excursion to Shide.** On Saturday, July 1st, about 20 members of the Section visited the Isle of Wight. Having driven from Cowes to Carisbrooke the Castle was seen under the guidance of Dr. de Castro. From Carisbrooke the party walked to Shide to visit, by the kind invitation of Professor John Milne, F.R.S., the world-renowned seismological observatory at Shide Hill House. Dr. Milne received his visitors very cordially and exhibited and explained the wonderful instruments, largely of his own invention, with which so many discoveries have been made in the branch of science with which his name is so prominently

associated. A large number of photographs and various models were examined; these enabled the nature and extent of earthquake disturbances to be understood very clearly. After Dr. Milne had shown his visitors over his observatories, and given a great deal of most interesting information on seismology and allied subjects, he and Mrs. Milne entertained the party at tea. The weather was very beautiful and the excursion will be remembered as of the greatest interest.

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# A Selection from the Papers read before the Society.

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## Mediæval Costume, as illustrated by the Monuments in Wimborne Minster.

By Miss Ida M. Roper, f.l.s.

Some few years ago the little Dorsetshire town of Sherborne came prominently before the world, because its enthusiastic inhabitants, wishing to do honour to the memory of St. Aldhelm, the founder of their Abbey and Bishopric, conceived the novel idea of carrying out an historical pageant to illustrate important episodes in the past history of the place. Rich and poor entered heartily into the spirit of the scheme, and through the excellence of the staging and acting the undertaking proved to be, as is well known, a complete success.

Indeed so successful was it that the idea of organizing pageants quickly spread and succeeding years saw similar spectacular displays performed in all parts of the country. This led to the study of ancient costume amongst a much larger body of people, and as it was felt that accuracy in the general grouping of the characters as well as in the minor details was desirable, diligent search had to be made into the records of mediæval times to bring about the effective results. The artist and the designer realised that many sources must be studied to gain an insight into the varying styles of dress and armour, the accurate rendering of which would add greatly to the life-like appearance of the characters, and to gain these ends it was quickly recognised that one of these sources would be the monumental effigies remaining in our churches. It may be interesting to point out here and show what a rich harvest the pageant-makers had at their disposal throughout all England, if I take the contents of just one building only and recall to your mind the costume to be seen upon the stone figures remaining in Wimborne Minster, an edifice

probably familiar to all. To most people there is nothing in a church or cathedral which seems so hopelessly devoid of interest as one of these stone effigies, oftentimes battered and covered with dust or pushed back into some odd corner or dark recess out of the way of the church-goer or casual visitor. And yet it is these very figures which can be made to awaken the imagination, and cause to come back and to a certain extent show the originals as they were in life and unfold a wondrous tale of past ages. It is not the string of virtues recorded on epitaphs that can teach us facts half so well as the figures themselves, which are generally shown in the exact reproduction of the costume worn in life and often a fairly good portrait in addition. There is scarcely a piece of mediæval armour remaining in England—only a score of helmets, a few isolated pieces of body armour, some protections for the knees, a cuff of a gauntlet or a few fragments of chain mail are all that have survived to our day. Therefore the history of early armour must be gathered from such sources as these stone relics, which illustrate the costume of the time with a fulness unknown elsewhere in Europe. To these authorities can be added the engravings on the Great Seals of the early kings, some small drawings or illuminated MSS, and that priceless work the Bayeux tapestry, which shows with great accuracy the armour worn at the end of the 11th century and serves as the starting point for all the protective metal work of succeeding ages. Later there are the monumental brasses which continue the history of costume to the end of the Tudor dynasty, from which period many original suits of armour are to be found in public and private collections. The numerous pictures by such artists as Holbein and Velasquez carry on the illustrations and give us all the details of their time, so that the other sources on which we had previously to rely are from now onwards of secondary importance for our purpose.

It will be well to consider the matter of costume in centuries and then we find :—

(1st) That the 14th century, when the Crusades were just at an end, gives us chain mail.

(2nd) That the 15th century, when the Wars of the Roses were fought, tells of plate armour.

(3rd) That the 16th century gives Elizabethan armour.

(4th) That the 17th century, when armour was almost useless for protection in fighting, affords opportunity for noticing civilian costume.

The earliest effigy at Wimborne is about 1313, a date when the figures are shown in the armour that had been in use without much change for the previous 100 years, and it is interesting to enquire into the reason for retaining this style. History tells us that in 1096 all Europe was called to arms by the Pope to recover Jerusalem from the Infidels and for just 200 years afterwards all the chivalry of England had its attention taken up to that end, and trained and armed itself for fighting in that distant land. It follows that the armour was such as best served that purpose and stayed on in that condition with only small variations which we can hardly deal with

here. The tactics of fighting in the Crusades were generally for ranks of mounted knights to charge on the active cavalry and bowmen of the Saracens in order to cut them to pieces with their swords, and at the same time to be so protected themselves by armour and shield as to avoid wounds. For this purpose they needed the lightest armour they could obtain, as long as it was effective, so that their freedom of movement was not hampered. It is true that during these centuries the knights quarrelled with those of other nations or amongst themselves, and that they constantly held tournaments or jousts for training and amusement, but these were secondary to the great matter of fighting the Infidels, and so the armour remained only such as was required for that purpose. We will now see what were the chief items of this light and pliant armour at the end of the Crusades, but as time has dealt hardly with the early figure in Wimborne Minster, it will be better first to consider a more perfect effigy, that we may become acquainted with the different parts and then compare them with the Wimborne knight.

The man was cased from head to foot in chain mail, that is, armour made of steel rings linked together in a regular manner, the upper portion being so shaped as to cover the head, arms and body in one piece, and the lower portion the two legs and feet in the form of stockings. This armour was worn over a body garment of leather, padded and quilted, so as to prevent the steel from pressing on the flesh or staining the linen under-garments, and below the knees was a leather thong tied tight so as to take the strain off the legs. The knight put on the upper garment or hauberk, as it was called, over his head, and it was then tightened behind and a lappet of varying size was tied securely at the side of the head to protect it securely in all parts except the actual face. The mail sleeves ended in mittens with separate receptacles for the thumbs, just like the woollen gloves worn by young children of to-day There was a hole in the palm through which the hands could be passed to allow the mittens to hang from the wrists when the bare hand had to be used. Thus covered in his armour of chain mail, the knight had little to fear from the attacks of his opponents amongst the Saracens who were armed with light arrows or short daggers. To prevent, however, the steel mail from getting rusty in the damp climate of England and to modify the heat of the sun's rays on the mail in eastern climes the knight wore over his armour a loose, sleeveless garment called the surcoat, which was made of wool or linen, reaching nearly to the feet behind and fastened by a narrow belt at the waist. About A.D. 1300 small additions were made to this protective armour, because it was found that the arms and legs of the knight when fighting on horseback were exposed to serious danger from wounds. The knees were therefore further protected by knee-caps and a light covering was also introduced for the elbows. These were made of *cuir bouilli*, which was thick leather boiled in oil and then dried to form a strong guard. The fighting with the Saracens being finished, and the nobility of the different nations having to maintain their possessions or their lives in their own countries, changes in armour began to be made to meet the new conditions. The fights now took place

between knights both about equally armed, and one of the first signs of the alterations appeared in the shape of the linen surcoat. This long flowing covering was very inconvenient for getting on and off horseback, and men called upon suddenly to fight on foot sometimes got their legs entangled in its ample folds and fell an easy prey to the enemy. The shirt was accordingly shortened, especially in the front and cut up at the sides, and was known as the cyclas. The cyclas, however, did not find favour amongst the nobility and does not appear on more than 20 monumental effigies, and yet one example is in Wimborne Minster.

Alas! the figure is but a relic of its past glory, for only the upper portion remains, but yet enough to show this interesting garment—the cyclas. Beneath it at the side is seen the chain hauberk, which is also continued over the head. An interesting feature is the covering for the hands, which instead of being of mail is an early instance of gauntlets made of scale work. The foundation of these gauntlets would have been of leather with small plates of steel fastened on and overlapping one another like the scales of a fish. The weapons shown are the sword and the shield. At this period the sword, a long and heavy weapon, was suspended from a broad belt set diagonally across the cyclas and fastened behind to the waist belt to keep it in position. The shield, made of wood, was shaped like a heater, and curved more or less to better cover and protect the body. On it were painted the armorial bearings of the owner, and it was fastened to a leather belt or guige passed over the right shoulder. In this case there are traces of three lions rampant, which have led antiquaries to presume that the effigy represents Sir John Plécy, who is known to have died about 1313.

On the way to the next century, the 15th, into which we have roughly divided our subject, it may be well to glance at the armour in use about 1360, which is half way to the next example in Wimborne, and note some of the chief changes. At the middle of the century fighting was continually going on in different parts of England or in our territory in France, and the nobles who took part in these many struggles found they were compelled to equip themselves with all the best defensive armour they could afford or obtain in order to protect their bodies against all kinds of weapons in use by their opponents. From this cause we see that as soon as the skill of the workmen could produce better defences, the fashions in the style of armour were changed and the chain mail was fast superseded by plate armour.

Let us get a good idea of the military costume of the time of Edward III c. 1360. The whole body is encased in pieces of armour made of steel plates, except just at those parts of the body where great freedom of movement is required; there the chain is still retained. And in order to vie with the costly and magnificent robes of the courtier, a short coat or jupon of velvet is worn over the body armour, the border being often cut into a pattern of foliage or vandykes and the whole embroidered back and front with the coat of arms. This garment is no doubt the origin of the term "coat of arms." Over it, on the hips, was clasped the elaborate baudric or

belt of costly goldsmith's work and manifold variety of decorations to carry the sword and miséricorde, or short pointed dagger. The head is shown well protected by a high and pointed helmet to which is attached a tippet of mail which covers the neck and shoulders. This style of armour is not shown on any effigy in Wimborne, but has been mentioned in order to make clear the changes and to bring us on to our next example, some 80 years later, when the warrior was literally "cased from head to foot in panoply of steel" and the workmanship of the armour carried to such perfection that according to an eminent historian "the art of defence had outstripped that of destruction."

The magnificent Somerset monument cannot fail to attract the most casual visitor to the minster. It stands on the south side of the choir under the arch of much earlier date which divides that part of the church from a side aisle. It consists of a table tomb of Sussex marble on which repose the alabaster effigies of John Beaufort, died 1444, and his wife, Margaret. He was the second son of the second Earl of Somerset and great grandson of John of Gaunt, and held the honoured title of Duke of Somerset. He fought often in France, holding the chief command there, and for a quarter of a century was in constant attendance on Henry V at Court. As the style of the chief portions of the armour cannot be readily seen by the visitor it will be well to describe them as seen on another effigy of the same period.

By this time c. 1440 the methods of warfare were completely altered and the same remarks apply to the contests in the lists at the tournaments, the weapons being changed as well. A knight fought singly against another of equal prowess and tried to thrust his opponent from his horse by charging with a long heavy lance tipped with steel; or they both drew up around them their followers of bowmen who first shot off their deadly arrows to bring down the enemy's horses, for the knights to charge in loose order of battle on the disorganized ranks and so cut them to pieces with their immense two-edged swords, or beat out their brains with heavy battle-axes. This kind of fighting meant terrific blows to be given or received, and to be prepared for such, the armour had to be strengthened in all parts to the utmost skill of the makers. For such a fight the figure is covered completely with plate armour of a heavy description such as would ward off most of the blows from sword or axe or guide away from vital parts the thrusts of the great lance. The body and shoulders are covered with specially heavy plates, so fastened together that they moved over each other as the body was bent in action, and as the warrior could not carry more than a reasonable weight of armour, the parts below were somewhat lighter in their make, although so arranged as to form an effective protection. Below the breastplate is a series of steel bands to cover the lower part of the body in front and behind with two small shaped guards strapped on the lowest band to strengthen the defence of the thighs against sword cuts or blows in a downward direction. The legs, knees and feet are also locked in steel. At the same time we must

remember the nobles and their knightly followers were not always engaged in deadly fights.

They had their meetings at Court, at Parliaments and at tournaments when all were in full dress, that is in armour embellished with the greatest possible display of wealth and extravagance from pride or rivalry. The Beaufort figure shows some of these interesting details worn on such occasions.

You will have noticed no mention is made of any head covering, whereas John, Lord Beaufort wears, what is unusual on effigies of this period, a light helmet or salade which was part of his suit of armour worn in civil life. It is made of steel plates shaped to fit the head with special heavy guards for the lower part of the face and neck in case any of the weapons in striking his body might slip upwards to his throat. The part covering his head would be only of moderate weight, because in the time of actual warfare or at the tournament he would have put over this helmet a still heavier casing of steel which completely covered his head and throat and was fastened by latchets on the shoulders. This headpiece or helm as it was called is often shown on effigies surmounted by the crest of the knight and laid beneath his head instead of a pillow. To bear the weight of this heavy helm there was a band of steel around the crown of the inner helmet and on occasions of state dress this band was replaced by an orle of silver gilt set with precious stones, thus making a light relief of colour to the steel breastplate. In the present instance in order to mark the rank of the deceased this orle is replaced by a ducal coronet.

In the same way a handsome belt was worn at such times across the hips to carry the sword and dagger, and this, too, was ornamented with gold work and jewels on a foundation of leather and coloured velvet. The swords at this period were often engraved with some motto or text on the hilt or blade, and in this instance the sacred monogram is shown on the top of the scabbard.

Just as in modern times those who are entitled to wear honours or orders have the insignia of them shown on their portraits when painted by leading artists, so at this time the effigies of the nobles are often represented with such badges of honour as were in vogue at that early period. Naturally Lord Beaufort, who was so close a companion of Henry V, would have received some personal mark of favour from his sovereign, and it is therefore not surprising to find that these badges are shown on his effigy. To deal with the lesser honour first we see that he wears round the neck the livery collar known as the collar of S. S. When the great rivalry for power was working out its destiny in England to culminate in the Wars of the Roses, the different nobles liked to show their importance by special badges or cognizance pertaining to their family, and the knights attached to these families were proud to wear such from loyalty to their chiefs.

In order to confer special honour on the most influential of their followers the nobles formed these badges into a collar, by fastening them at intervals on a band of leather and velvet, and in a short time

all the knights sought to deserve this recognition as a personal distinction, and in due time had them shown on their effigies. The chief collar that is met with at this period is the Lancastrian collar of Henry IV, of the S. S. (an abbreviation of Sovereyne or King), to be followed by the Yorkist collar of Edward IV, formed of alternate Suns and Roses. When the Tudors finally succeeded to permanent sovereignty the two Houses combined and employed the well known badge of the Tudor rose, and the Yorkist collar naturally disappeared from use with the losing cause. The collar of S. S., however, is still part of the official insignia of our Judges. Beaufort must have received such a collar as a sign of his attachment to the Lancastrian dynasty. Below the left knee he wears the Garter, the simplest sign represented on effigies to show that the wearer was a Knight of the Order of the Garter, and in this case no doubt conferred upon him for his loyal services to the Throne. It is buckled with the end arranged in a special knot and is similar to the Garter we are accustomed to at the present day.

On many monumental effigies we find the complete costume of the Order is shown, viz., the mantle, the collar with the pendant George, and the Garter, but in this instance there is only the Garter. Taken in all its details this effigy affords many interesting points for examination and enquiry. We will leave the consideration of the Lady Margaret's costume until later, when we can briefly trace the chief fashions that were adopted by ladies at different times. We will therefore consider armour for a little longer.

In Henry VIII's time suits of armour were made of the most beautiful workmanship, which retained all the details of the separate pieces formerly used in battle, but which were now only needed for purposes of show, or for tilting, with hollow lances tipped with blunt points. Many of these suits are preserved in the Tower and at Windsor and from these examples we learn that the armour still consists of a headpiece, bodyguard, heavy shoulder pieces and careful protection for all parts of the body, just as in the Beaufort figure, but the pieces are fluted and engraved in elaborate pattern to give a highly decorative appearance. The use of gunpowder and the methods of fighting by masses of lightly armed soldiers led by active leaders on horseback had done away with the use of the heavy armour in actual warfare, so that when we come to the end of the 16th century in the time of Elizabeth great changes are to be noticed.

Armour was still the official dress of nobles and knights, and many a quiet country personage whose time was occupied in looking after his estates was accustomed to be shown dressed in armour such as he never put on in his lifetime, and if he had, would have found it as uncomfortable to move in as would a modern man.

Let us consider this style more fully. The weight of the pieces about the shoulders still remained as a protection against bullets, but the helmet was gone and all the rest of the body was protected by much lighter coverings. Queen Elizabeth having set the fashion of long waists, the nobles had to follow, and so we find the breastplates brought down into a point, called peascod-shaped, and the great extension at the hips required by fashion caused the leg

pieces to be constructed of a number of small plates hinged on each other to permit movement and forming a covering from the hips to the knees to be strapped over the padded breeches.

In the Minster there is a good representation of these pieces of armour on the effigy of Sir Edmund Uvedale, who died in 1606. He was a second son of Frances Uvedale of Horton and was honoured with a knighthood.

Signs of making the armour more comfortable to the wearer are found in the muslin collar and cuffs and in the bare hands, the covering for which, in the form of a heavy gauntlet, is shown beside him. The same idea is further carried out by representing the figure lying comfortably on his side supporting the head on his right hand, an attitude that had become usual at this period, instead of the more formal one of lying on the back as dead. Being carved in soft alabaster stone, all the details of the fastening together of the pieces of armour are clearly shown by strap and buckle or by hook and staple, and the details of the hangers of his sword are very similar to the sword straps still in use in the army. Want of room on the floor of churches, now required for the use of the parishioners, had caused monuments to be placed against the walls, and this in its turn had given opportunity for lofty erections with all kinds of decorative work to produce an imposing memorial to the dead, and Sir Edmund's is a good example of the period.

Following on this and some 40 years later we have against the west wall of the nave another lofty monument in memory of a legal man and his wife, kneeling face to face before a double faldstool, a very common position in which to represent figures from this time onwards. Such monuments give opportunity for the display of much heraldry, of lengthy inscriptions and many allegorical figures and emblems of the Virtues and of Death, etc.

The man is Thomas Hanham, a barrister of the Middle Temple, died 1650, who to give him full honour, is shown in his barrister's gown. He wears the ordinary costume of a gentleman of the period, consisting of a doublet buttoned to the waist and knee breeches, and over this is the legal gown falling in folds around the feet gathered into a square collar behind and having long pendent sleeves lost amidst the folds, with slits near the shoulders for the arms to be passed through. Such barrister's gowns usually had an ornamental facing of knots and strings formed of twisted cord, but these are not shown in this instance. His wife, who was a daughter of Sir William Doddington, is in the plain dress of the Royalists, at the time when the Puritans had the upper hand. A long flowing gown with full sleeves finished with neat cuffs and collar, with the spread out collarette on the shoulders, and a close-fitting cap and large coverchief to complete the costume.

All through the history of costume in England that of the ladies played an important part. The women-folk of the nobles and courtiers made use of the very best materials they could obtain, according as the skill of the foreign or English manufacturers produced them, including furs, jewels, cloth of silk and gold, etc.

Sometimes the fashion of shaping the costumes was copied from the men and at other times they struck out fresh ones for themselves.

From the beginning of the 13th century to well into the 14th the heads and necks of ladies were closely covered up by muslin or lawn wraps, a style worn out of compliment to their lords, who protected their head and shoulders with chain mail.

At a later period, when the knights wore on top of their helmets bunches of feathers or other flowing decorations, their wives took to fastening on their heads erections of gold wirework and jewels on which they fastened coverchiefs in various graceful forms, thus producing the horn, the butterfly or the mitre head-dresses. Examples of these are often found on effigies, but Lady Beaufort, however, is shown in the simplest form of head-dress, in a veil covering the hair and falling behind to the shoulders and surmounted by a small coronet, probably in imitation of what was usual on the effigies of Royal ladies.

She is habited in two long gowns, cut low at the neck, the under one is tight-fitting and of some brilliantly coloured material with tight sleeves buttoned to the elbow. The upper gown reaches also to the feet, but has no sleeves, and is cut away at the sides and bordered with fur or velvet. This curious open gown earned for itself in modern times the name of the sideless gown and was much worn in the 15th century as a means of showing off the expensive materials of the different dresses. Over all she wears a long mantle of state fastened in front by a silken cord, and round her neck is the S. S. collar similar to the one worn by her husband.

For the rest, it may be said that the women's costumes varied in details as much as in more modern times, but that in the main, the fashions ran on for half centuries or more at a time, and when there was a change it was done rapidly and completely. This of course holds good only of the Court fashions and for the wives of important people in the counties.

The great number of paintings of noted people that have been preserved in England of the Tudor period has made us familiar with the dress of the Elizabethan times. We know the ruffs of many folds, the long pointed stomachers, the padded hips and the rolls at the shoulders, all worn to carry out the ideas of fashion started by burly King Henry VIII. On the head came to be worn at this time and for years afterwards the Paris hood, introduced by Mary Queen of Scots from her residence in France, and this style proved so becoming to all types of faces, that little wonder need be felt that it became such a general favourite.

This style of costume would have been worn by Lady Uvedale, but her effigy does not appear at Wimborne, and as the other ladies are so plainly dressed I have not entered so fully into the details of their costumes as with the more complicated armour of the men, in order to confine my remarks to the actual effigies in the Minster.

# Nipadites in Eocene Beds at Bournemouth.

By Sir Daniel Morris, K.C.M.G., D.Sc., D.C.L., F.L.S.

Among the fossil remains of plants found in the Eocene deposits in the neighbourhood of Bournemouth probably the most interesting are the leaves and fruits of palms which indicate in the early part of the Tertiary period the existence of a flora of a more or less tropical character.

In a 'Monograph of the British Eocene Flora,' by J. Starkie Gardner, F.G.S., and Baron Ettingshausen (vol. i, pp. 16-18), 1879-1882, frequent mention is made of the occurrence of the leaves and seeds of palms in the Bournemouth cliffs. The sections in the western portions of the cliffs contained the older beds with leaves of dicotyledonous forest trees. In the central cliffs near the pier were found leaves of palms and ferns, while to the east at Boscombe and beyond were found remains of a marsh or swamp vegetation, and finally fruits, seeds and branches which had been floated out to sea.

In the fresh water beds in the central series "large pinnate leaves of palms crossing each other in all directions" were observed. A portion of one of these palm leaves measured "four feet in length by three feet in breadth." A neighbouring bed contained "large pinnate leaves of a palm resembling an *Iriartea*, which now flourishes in the forests of Peru and on the banks of the Amazon. In succeeding beds under the Coastguard Station seven or eight layers of deposits, separated from each other by coarse quartz grit, contained "pinnate and palmate leaves of palms." In the marine beds to the east forming a higher horizon than the leaf patches above referred to, fruits and seeds of sixteen different kinds were found closely related to the fruits found in the London clay at Sheppey. Among them Mr. Starkie Gardner discovered those of *Nipadites*, a genus founded by Bowerbank in 1840 in his 'History of the Fossil Fruits and Seeds of the London Clay.' Similar fossil remains had been found both in this country and on the Continent during the last two hundred years, and various conjectures had been hazarded as to their true nature. Parson in 1757 compared them with "figs petrified in a green state." Burtin suggested that the larger Belgian fruits might be fossil cocoa-nuts. Parkinson in 1804 also referred them to *Cocos*. Bronn in 1837 substituted *Cocites* for *Cocos* and placed them among the *Pandaneæ* or Screw Pines. Bowerbank's name, *Nipadites*, as mentioned by Rendle, emphasized the relation of the fossils to the recent genus *Nipa* and "so near in fact is this relation that one is tempted to follow Ettingshausen, who in a list in the 'Proceedings of the Royal Society,' xxiv, p. 393, reduces all the species to *Nipa*."

On the principle of leading from the known to the unknown, it would be convenient to give a brief description of the *Nipa* palm in order to obtain a fuller grasp of the characters of its fossil ally—*Nipadites*.

In *Nipa fruticans* (the only species) the pinnate leaves resemble those of the cocoa-nut palm and attain a length of 15 to 20 feet. The fruit is one-seeded (and not three-seeded, as in the cocoa-nut palm), and it is aggregated in heads as large as that of a man. There are 30 to 50 single fruits in one head, altered according as they are fertilized or non-fertilized and according to their position in the head. [At the reading of the paper a head of *Nipa* obtained direct from the tropics was exhibited and the several parts explained and compared with the fossil palm.] The single seed germinates within the fruit, which falls into the sea and is carried away, but it is detached from the head only after a long period, when the germination of the seed is so far advanced that the salt water cannot injure the embryo. The foliage of the *Nipa* is used in the tropics as thatch, and when burnt yields a supply of salt. From the toddy yielded by the spadix, sugar, vinegar, yeast, and a strong spirit are obtained. According to the "Dictionary of Indian Terms," p. 479, "the slang word *Nip* for a small dram of spirits is adopted from the *Nipa* palm." The white kernel of the fruit, as in the case of the cocoa-nut, is edible.

The *Nipa* palm is found on the swampy shores and estuaries in India and the Moluccas. Sir Joseph Hooker in his "Himalayan Journals" refers to the "low vegetation which covers the Sunderbunds (in the delta of the Ganges) growing in brackish swamps chiefly made up of a dwarf-palm and small mangroves. . . . . Every now and then the paddles of the steamer tossed up the large fruits of *Nipa fruticans*, a low, stemless palm that grows in the tidal waters of the Indian Ocean and bears a large head of nuts. It is a plant of no interest to the common observer, but of much to the geologist, from the nuts of a similar plant abounding in the Tertiary formations at the mouth of the Thames having floated about there in as great profusion as here, till buried deep in the silt and mud that now form the island of Sheppey."

Returning to the fossil *Nipadites*, Bowerbank originally described thirteen species, but, as pointed out by Rendle, subsequent workers have shown, and Bowerbank himself seems to have realised, that he had made too many species founded on too slight differences which may be individual variations or the result of the degree of maturity of the fruit or its position in the capitulum. This may be readily understood from an examination of the fruits of the modern *Nipa fruticans*, which are densely packed in a spherical head. There seems to be no reason to doubt that the fossil fruits were borne in a similar way as a corresponding variety in shape and size is evident in one and the same species.

In a 'Revision of the genus *Nipadites*, Bowerb.,' by Dr. A. B. Rendle, F.R.S. (Journ. Linn. Soc., xxx, 143, pl. vi, vii), it is stated that "the conditions under which the fossil fruits are found show that like their modern representatives, the palms grew in the rich brackish mud of the shore or river mouth. Associated with the Sheppey fruits are the remains of crabs, freshwater turtles and a great variety of fruits and seeds, with some stems and branches; such a collection of marine and freshwater organisms as is

characteristic of the delta of a large river. The great diversity of forms and the water-worn conditions of many of the specimens indicate an assemblage brought together from a large area. On the other hand, the appearance of the fruits which I saw laid bare by the receding tide on the Sussex coast argues strongly for the view that they had grown close by. So uniform was their size and condition that they might have fallen from one tree, and having germinated almost where they fell, left only an empty shell now filled with sand. Herein, too, they differ from all specimens I have seen. The mineral cast of the interior of the London clay and Belgian fruits which replaces the seed was evidently formed by the filtration of dissolved mineral matter through the pericarp, while the Sussex specimens are empty shells filled with sand pushed in from outside through the aperture left in germination. In every case there is ample evidence as Bowerbank, Ettingshausen, and Schimper have demonstrated, from both the fossil fauna and flora of a tropical, or at least a sub-tropical climate.

As already stated, the credit for the discovery of *Nipadites* at Bournemouth is due to Mr. Starkie Gardner. Beyond the interest attached to the fruits themselves there is the probability they will serve as a means of correlating the leaves and flowers of the Middle Bagshot flora at Bournemouth with the fruits at Sheppey. Mr. Starkie Gardner evidently realized this, for he mentioned at the time that the fruits had a value which the botanist might refuse to leaves alone.

In the Geological collection of the Bournemouth Natural Science Society there are fragments of casts of *Nipadites* collected from time to time in the Honeycombe Chine, near Boscombe Pier, the property of Mr. G. G. Hamilton, F.R.C.S. One or two specimens are labelled "Gardneri"—a name that cannot be traced and probably was never published. Recently a complete cast was obtained from Honeycombe Chine by the writer. It was forwarded to the British Museum Natural History. An exact determination was not possible but Dr. Rendle is inclined to call it *N. Parkinsonis*, Bowerb.—a figure of which appears in Journ. Linn. Soc., xxx, pl. 7. Specimens of *N. Burtini*, Ad. Brogn. with fruits as large as cocoa-nuts are mentioned in Dr. Rendle's Revision (1895) as having been discovered by Mr. Clement Reid, F.R.S., at Bracklesham and West Wittering, in Sussex. Also some fine specimens "as large as the Belgian ones," were discovered by Mr. Reid at Hengistbury Head, about four miles east of Honeycombe Chine. "Unhappily," writes Dr. Rendle, "it seems impossible to keep these fruits for any length of time, as they consist of a carbonised shell filled with sand, which rapidly crumbles on being taken from the damp beach while the carbon film cracks and peels." *N. Burtini*, originally known from Sheppey and the Brussels Eocene, by Mr. Reid's discovery has been pushed westwards to the west of Hampshire.

1. Fruit of Nipa fruiticans ($\frac{1}{3}$ nat. size).
2. Section of do. with seed cavity.
3 & 4. Nipadites from Bournemouth cliffs (nat. size).

EXPLANATION OF THE PLATE.

1.—Single fruit of *Nipa fruticans* with terminal umbo, one-third natural size.
2.—Section of similar fruit with single seed cavity; showing also the outer spongy tissue of the epicarp, the thin hard mesocarp (white line) and the endocarp.
3.—Cast of *Nipadites* from Honeycombe Chine (Morris) *N. Parkinsonis*, Bowerb. ?
4.—Smaller cast from the same locality, from the collection of the Bournemouth Natural Science Society.

(From drawings by Miss Chidell)

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# Euonymus Mildew

*(Oidium Euonymi-japonicæ).*

By GEORGE MASSEE, ESQ., F.LS., Royal Gardens, Kew.

EUONYMUS JAPONICUS, an evergreen shrub, a native of Japan, is one amongst the few ornamental shrubs capable of resisting the injurious action of sea spray, hence it is much in evidence at seaside resorts, more especially along the South coast. Although established in this country for many years, and extensively planted, until within about the last ten years it was remarkably free from disease, when, almost simultaneously at several localities along the South coast, it was attacked by a white mildew, which in some instances developed to such an extent that the bushes presented the appearance of having been covered with a thick coat of white-wash.

The fungus, called *Oidium Euonymi-japonicæ*, closely related to the hop mildew, rose-mildew, and the American gooseberry mildew, is a native of Japan, where it attacks the *Euonymus* as a wild plant, and it is somewhat remarkable that the host-plant should have remained so long free from its parasite, both in this country and on the Continent. A severe outbreak of the mildew on the *Euonymus* was recorded from France, about the same time that the pest appeared in this country.

The fungus first appears as small white scattered spots, more especially on the upper surface of the leaves. These spots gradually increase in size and grow into each other, frequently eventually covering the greater portion, or the whole of the leaf.

After the patches have been growing for some time they present a mealy appearance, as if they had been dusted with flour. This is due to the presence of myriads of very minute spores, which are produced in upright chains, and become free from each other as they mature. These spores are washed by rain, or dispersed by wind, birds, insects, etc., and those who happen to alight on other healthy leaves set up an infection which in turn produces more spores, and as this production of spores continues throughout the summer season it can be readily understood how quickly the disease can spread unless checked by prompt and drastic measures.

Only the young tender leaves can be infected by spores falling directly upon them, the epidermis or skin of old leaves being too tough for a germinating spore to penetrate. Old leaves, however, are readily infected through a wound, such as might be caused by the puncture of a "green fly" (aphis) or other insect or caterpillar.

The white moulds, to which the fungus under consideration belongs, produce two kinds of spores, those mentioned above being known as summer spores. These are produced in enormous numbers, and in rapid succession during the summer months. Their special use is to enable the fungus to extend its area of distribution at a rapid rate. The summer form of spore is always the kind to produce an epidemic, or the rapid development and extension of a disease. The second kind of spore, called a winter-spore, is produced in quantity late in the season, when the host-plant has ceased to grow for the year. These spores do not germinate at once, but remain in an unchanged condition until the following spring, when they germinate and infect the young foliage of the host-plant.

Now it so happens that the mildew on *Euonymus* only produces summer-spores in this country, and consequently cannot reproduce itself the following season by means of winter-spores. However, the white patches of mildew on the leaves retain their vitality throughout the winter, and produce a crop of summer-spores the following spring. These summer spores infect the young foliage, and commence the epidemic anew.

### Preventive Measures.

The chief point to keep in view is the fact that unless the bushes are infected in the spring of each season there can be no renewal of disease.

Such infection depends on the presence of the fungus on the leaves of the previous season. It might prove impracticable to remove all such diseased leaves and to promptly burn them, but the disease would be reduced in proportion to the number of badly diseased leaves that were removed.

Commencing about the middle of March, flowers of sulphur should be dusted on diseased plants in warm places where the sun shines on the bushes, or both diseased and healthy plants should be sprayed with a solution of sulphide of potassium (=liver of sulphur), two ounces dissolved in three gallons of water. The spraying should be repeated at intervals of ten days for the first two months, and afterwards at intervals depending upon the continuance of the disease.

If insects appear on the bushes they should be kept down by means of an insecticide.

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Sir Daniel Morris, K.C.M.G., F.L.S., by whom the paper was read in the absence of Mr. Massee, exhibited leaves of Euonymus attacked by the mildew and added further information on the subject. *Euonymus japonicus* was introduced to this country in 1804, and there are several handsome variegated forms with gold and silver markings.

*Euonymus radicans* is a small leaved variety with a decumbent habit. This has also numerous highly ornamental sub-varieties. It is realized that it would be a great misfortune if a plant so extensively used for borders and hedges, and sometimes trained as a creeper, were to be so severely attacked by disease as to impair its usefulness or necessitate its complete abandonment.

Mr. E. S. Salmon, F.L.S., of Wye College, has published a full account of the life history of the disease in the *Journal of the Royal Horticultural Society, Vol. xxix, pp. 434-442.* The plate attached (with the permission of the Council of the Society) is reproduced herewith.

Mr. Salmon is of opinion that the earliest date of the occurrence of the disease in England was in the year 1900, when it was noticed on shrubs of *E. japonicus* trained against the wall at the east end of the Shelter Terrace in the Madeira Road at Brighton. The disease soon spread to the west end. In 1904 Mr. Salmon himself observed it extremely abundant on plants along the whole sea-front for over a mile. Later it has been found at Bexhill, Hastings, Ramsgate and Dover. At present it is most abundant in the neighbourhood of Portsmouth and Bournemouth, and it is evidently travelling steadily along the South Coast and many places inland.* It is noticeable that the disease is worse in places where the shrubs are growing in shaded and ill-ventilated situations.

On the Continent it was noticed at Florence in 1899 and in great abundance at Livorno in 1900. Since then it has spread to Austria, Hungary and France. The disease is well known in Japan, the native home of *E. japonicus*. Mr. Salmon is of opinion that the fungus may have been lately brought to Europe on diseased plants from Japan. This will explain its epidemic character since it is established that a parasitic fungus on reaching a new country attacks its host-plants with exceptional virulence for several years after its arrival. Examples of this are seen in the historic case of the Vine mildew, and also in that of the recently introduced American Gooseberry mildew.

A peculiarity of the present mildew is the capacity it possesses of persisting by means of hibernation of its mycelium. If the leaves of affected shrubs are examined in the winter months many will be found on which the mycelium persists in the form of definite rounded or irregular patches. The mildew appears able by means of these patches to exist continuously on the evergreen leaves of the Euonymus, to lie dormant through the unfavourable winter months and again produce spores to infect the young leaves in spring.

In experiments carried out by Mr. Salmon he found the following varieties of *E. japonicus* to be fully susceptible to the disease: "aureus," "albo-marginatus," "ovatus aureus," "microphyllus" and "President Gunter." *E. radicans* or its vars. "microphyllus" and "Silver gem" proved also to be fully susceptible, but the var.

* Mr. Massee, writing on November 10th, 1911, states:—"the Euonymus mildew has now extended along the South Coast to Cornwall, and it has also been met with on the Southern and Western Coasts of Wales. Spraying as suggested has proved effective when commenced in quite early spring before the new shoots appear, coupled with the removal of all fallen leaves."

"Carrièrei" were found (as far as these particular experiments went) to be completely immune. *E. nanus* proved to be practically immune when uninjured leaves were inoculated.

The question of the best means of combating the disease has been considered under "preventive measures" in the preceding note by Mr. Massee who has also drawn attention to the desirability of picking and destroying the infected leaves during the winter season and so prevent a renewal of the disease in the spring. The fungus is so conspicuous that the affected leaves can be easily recognised and if collected and burned the disease would be reduced in proportion to the number of badly diseased leaves thus get rid of.

Commencing about the middle of March of each year, Mr. Massee suggests that the plants be sprayed with a solution of sulphide of potassium (livers of sulphur),—two ounces dissolved in three gallons of water. When the new leaves are very young the solution might be of lower strength, viz., one ounce to two gallons of water. It is important that the spraying be continued at intervals of ten days for two months in order to be thoroughly effective.* In Italy a fungicide (cupric sulphur), containing flowers of sulphur, to which three per cent. of copper sulphate has been added, has been found effective, as even in the most serious cases the repeated application of this solution has restored the vegetative growth of the plant to a satisfactory condition. In cases where the plants have been perceptibly weakened by the attacks of the disease a small dose of nitrate of soda should be given to the soil. Plants of Euonymus growing under shade and very badly attacked might be replaced by other plants, in order to lessen the risk of spreading the infection.

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## Notes on River-courses in the South of England.

By H. St. Barbe.

The remarks which I had the honour of presenting upon the above subject before the Geological Section of the Society on a past occasion were of a rather discursive nature, designed to illustrate some salient points of the enquiry and especially such as could be exemplified in local or readily accessible instances. This latter precaution it is as well to keep in front in the present paper, and fortunately Bournemouth is situated in the centre of some of the most striking features connected with the subject. But it is well to present this, or so much of it as can be treated within the limits of a few pages, in a more connected form, and I am much obliged to the Council for the opportunity of doing so.

* Where any difficulty is experienced in obtaining a supply of sulphide of potassium it may be ordered from Walter Voss & Co., Ltd., Millwall, London, E., at the rate of one pound, free by post, for 1/8.

**Twig of E. japonicus, with the upper Leaves bearing numerous white patches of Mildew (Oidium Euonymi-japonicæ), nat. size**

(Journ. Roy. Hort. Soc., xxix, fig. 139).

BRITISH MUSEUM
NATURAL HISTORY

The present is not the occasion to give an outline of the whole modern theory of the rivalries and activities of rivers. It is best to refer to some of the writings of Professor W. M. Davies, of Harvard University, through whom this theory as a distinct study first became known and passed into the common acceptance of physical geologists. His "Notes on the development of certain English Rivers" (*Geographical Journal, vol. V, 1895, pp. 127-146*) and on "The Drainage of Cuestas" (*Proc. Geol. Assoc., vol. XVI, 1899, pp. 75-93*) may be specially indicated For our present purpose it will be enough if we bear in mind that the rivers—under which general term we may class all flowing water in its grandest or puniest expression, from Ganges to brook—are constantly in motion; not in the obvious sense of the passage of their waters from a higher to a lower level, but in regard to the expansion or contraction of their watersheds and their volumes and the lateral shifting of their courses.

Since watersheds in a well drained country like England are but narrow strips of upland, it follows that an expanding river system must be continually preying upon its neighbours, and that in a complex area of sources and tributaries, a petty theft may easily result in a wholesale readjustment of systems and boundaries. Such a predatory warfare has been carried on over the south of England with ceaseless activity during the latest Geological ages. In the north and indeed everywhere it has been much the same, but in the higher latitudes of this country the operations have been enhanced or paralysed, and in either case confused, by the action of moving ice. The sheer strife of river against river is not there so clearly to be followed. It is not quite so simple a problem even in the south, because the sea has so often taken a hand and put an end to minor rivalries, and this is so in the conspicuous case which we have here close at hand in the Solent.

The south has another advantage for our purpose, in that it presents a far more orderly arrangement of strata over wide areas, far less interrupted by complicated folding and faulting than is the case with the older rocks of the north. Excluding the Devon-Cornwall peninsula and the Mendip upheaval, we have, broadly speaking, over half of England a steady gentle south-easterly dip of the whole series of strata, only markedly varied by the south-west to north-east *echelon* of earth foldings which have thrown up the cretaceous rocks in overlapping folds stretching individually east and west, and have specially resulted, as softer beds have worn away, in those undulations and escarpments of the chalk which furnish our most characteristic scenery.

The whole subject might almost be called the intelligent appreciation of scenery on a physical basis—as anatomy is the ground work of figure painting. And that person can only be pitied who affects to believe that the æsthetical taste for scenery is dwarfed or dimmed by enquiry into the forces and actions that have moulded its outline.

It would seem hardly possible for anyone with an eye to nature to take a steamboat trip from Bournemouth to Cowes without being struck by the non-marine character of the shore on either hand.

Once past the low shelf of shingle at Hurst, the mind can readily picture a broad winding vale bounded by the austere Island downs on the south and the gentler shelving forest slopes that face them on the north. Fill that vale with forest or with low rank herbage, as you will; the mental picture still requires as a complement a stately river winding with the windings of the land or meandering in lesser curves. Doubtless there have been both these phases, and the mind has only recalled a past actuality.

The whole course of this river of the past—it may be said, of many pasts—is not accurately known, and geologists are now invited

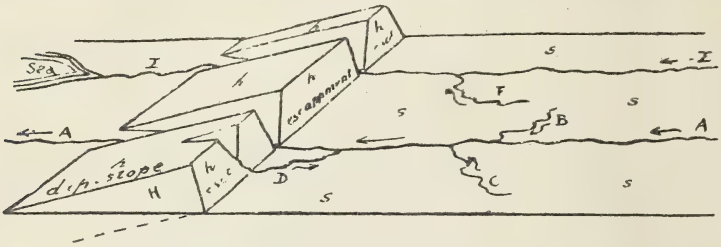


Fig. 1. Consequent Rivers flowing over a plain of soft strata and through an escarpment of harder rocks.

to call it by the name of its modern estuary, the Solent. But it seems allowable, as implying some comprehension of its later history at least, to speak of it as the Frome-Solent.

If we follow the present river Frome back to its sources in the hills of East Dorset, we must then consider, remembering that no rivers rest unmoved in their boundaries, whether this one has been growing or dwindling. At this point it is best to revert to pure physics and interpose a diagram, fig. 1. In its essentials it is much the same as shown in many text books, but instead of a plan, I have given a bird's eye view of a scene from which all elements of the "picturesque" are carefully eliminated. The out-crop of the hard rock, h, h, is shown as though cut out of wood—much in the shape of an old fashioned writing desk. These rocks, h, h, overlie the softer beds, s, s, and the whole are supposed to have a slight dip towards the sea on the left. The dip of s, s, cannot be very well shown.

Two main rivers, A and E, are shown. They follow the dip slope, which is the main or original *tilt* of the country, and they are therefore called *consequent* rivers. During the wearing down of s, s, they have had time to cut gorges through h, h (through which they must perforce run out of sight, the principles of perspective being stronger than the will of the draughtsman). Two lateral tributaries of A, B and C, are shown in the vale of s, s. They have arisen during the delving out of the water, and are called *subsequents*. Also a small stream, D, is seen rising within the escarpment and flowing into A. By reason of the position of its source, from which it should by the formation of the country flow to the left instead of reversely, it is an *obsequent* stream, probably of later date than B, or C. Now, not far from the sources of B, we note the rise of a *subsequent*

tributary, F, of E. F and B are in antagonism. There is doubtless some subsidiary watershed, caused by some more durable beds of s, s, between their springs. We must now search for some factor which will give either F or B the mastery, and it may be looked for either on the courses of those streams or the main rivers which they feed. It may be that F or E on the one hand, or B or A on the other, have found a more yielding bed, one which they can more quickly deepen, to give their head water more fall, or perhaps the course of one or the other combination finds a readier access to the sea, which would give the same effect.

The latter state of things is shown in the figures. On the left the immediate junction of E will be observed. Other things being equal, E and all its affluents will lower their valleys and enlarge their dominions with enhanced powers relatively to the A system. The result is that F will capture the head waters of B, and the latter will, probably in a series of steps with stagnant poises, be eventually reversed and joined to F and will partake in its accelerated activity. In course of time fig. 1 will become as fig. 2. Here the position of the various rivers has not been altered, though in nature some lateral shifting would usually take place. Also the escarpment of h, h is not shown to have receded, to enable a readier comparison of the two figures. Only the little "corrie" formed by D is somewhat enlarged and deepened. But the entire water system of the plain s, s is altered. The capture of B by F is obviously followed by that of the head waters of A, now A 1, and of the affluents C and D. B is now an *obsequent*, and so also is the small intermediate portion of A, now A 2, which is seen reversed and adding its quota to the waters of E. A itself, the much reduced A 3, now has its rise somewhere within the gorge, out of sight in the diagram. The lower valley of A 3 would be found in nature to be what Professor Davis has called a "misfit," many sizes too large for its stream, whose meanderings would bear no relation to the curves of its valley sides.

A very perfect instance of an A 3 is found in the Blackwater which now rises at Aldershot and flows north-westward into the Loddon. The South Western Railway crosses it a short distance

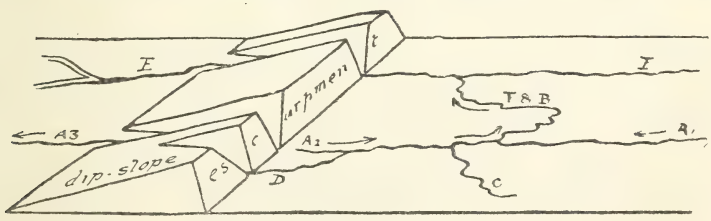


Fig. 2. A later stage of Fig. 1.

on the London side of Farnborough station. An examination of the remarkable dry gap in the chalk range between the rise of the Blackwater on the north and the abrupt angle in the course of the Wey on the south will lead to the conclusion that the Wey has been purloined from the Thames at this point, and its lower valley, of

fine and sweeping proportions, is now occupied by the little staggering Blackwater, obviously lost in the magnitude of its surroundings. In fact, if we substitute the Thames for the sea in fig. 1 and 2 as the ultimate receiver, and call the A gorge Aldershot and the E gorge Guildford, and bear in mind that A 1, B and F, and the lower E are now all one river (as in fig. 2) under the name of the Wey, these figures bear a very striking resemblance to the actual physical facts. Yet they were drawn with no reference whatever to that or any particular locality, and are only as has been said a text book illustration in a varied form. Another cause is added here to the mastery of E over A, since the Wey joins the Thames at a lower level than the Blackwater Loddon. When the sea is the direct receiver this factor could not arise.

An examination of any good map on which the contours can be followed will suggest more than one place where the old Frome-Solent has been suffering similar spoliation. Since during the whole of its more extended ancient course it was passing down a dip-slope, it has been losing by the recession of the escarpments. It is only when it arrives within the security of the Dorset syncline, with tertiary strata dipping laterally towards its bed on either hand, that it resists further depredations. In this respect its next door neighbour the Thames is in precisely the same case. The Bristol Avon, having now a north-westerly course, is much in the position of A 2, the reversed *obsequent* middle portion of A ; whilst the Welsh Wey across the Bristol Channel, the drowned Severn Valley, is the representation of A 1.

This succession, of Wey, Bristol Avon, and Kennet-Thames, forms one of the most suggestive river series we have. The railway between Bath and Newbury passes through the scene of the old Avon and Kennet rivalry, in which, as ever, the Kennet has suffered by the retreat of the escarpment within which it is now confined. It is an A 3 (fig. 2). In the neighbourhood of Devizes the battlefields can be explored. It was a campaign of many crises and is indeed still in progress, except that the hand of man by means of the Kennet-Avon Canal has endeavoured to effect a truce.

About due north from the mouth of the Avon, transversely across the Severn estuary, we note the mouth of the Wey, and a good physical map or a chart will show a deep channel between two reefs of rock connecting the two rivers. Lying as it does athwart the main estuary, this channel affords a very suggestive link between Wey and Avon. It seems as though the ancient Wey once poured through a deep gorge of carboniferous limestone similar to that of its now reversed lower part the Avon, at Clifton. This is a case where the sea has given a verdict which we may call final, until some further emergence of our western lands may occur in the course of ages. But we need not let the salt water which now ebbs and flows in that old valley obscure our view of the past, any more than we suffer it to in the Solent. We can picture in the Bristol Channel the valley of some westward flowing stream from the flanks of the Mendips, similar to F in figs. 1 and 2, which cut its way back until it annexed the Severn and the Warwick Avon and gave them a

direct and rapid fall to the sea, which enabled the Severn not only to cut its own system adrift from the Thames but thereafter to proceed to rob the latter river of half its tributaries along the Cotteswold escarpment.

Again a similar struggle has taken place between the Frome and, probably, the Parrot. Here again the Dorset-river has been worsted by its rival working quickly backwards and downwards in the flat Somersetshire plain and up to the escarpment slopes of the retreating West Dorset highlands. It is as well to give the caution that none of these processes may have been the work of the actual existing rivers as we know them to-day. It is convenient to name them so as to gain a ready topographical guide to the events that are outlined, and indeed these modern rivers are now no doubt the immediate representatives of the protagonists of former days. But rivers are always shifting their courses laterally over considerable areas, and in some cases the modern valleys are greatly diminished, and the old bottom gravels may now be found on terraces at a height of 200 or 300 feet above and miles away from the present rivers. Therefore when we speak, for instance, of the Frome of past ages, we mean in effect that river which occupied broadly the same country and had the same general direction as the modern river, which latter now meanders in a valley *within* that of its ancestor.

Now the Frome Solent having lost territory not only at its head but also by the incursion of the sea upon its lower course, has this latter catastrophe had any effect upon the lateral tributary streams? Seeing that the way to the sea has thus been shortened and simplified we might expect to discover some display of enhanced action—to find for instance an F (figs. 1 and 2) in action in some direction. When I had the pleasure of addressing the Society on this subject, I pointed out the fine valley, now dry save for a very insignificant stream, which runs due east into the Test valley at Mottisfont. The railway between Romsey and Salisbury takes advantage of this valley. There is only a low ridge between its head and the neighbouring Avon to the west at Alderbury. On the opposite bank the Avon receives a stream, The Ebble, which comes also due eastward from the northern slopes of Cranborne Chase. Not having examined the ground in detail I did not then suggest what seemed nevertheless a very likely conclusion. Mr. Clement Reid, however, in his late paper read before the British Association at Portsmouth, has instanced the Hampshire Avon as a once minor tributary of the Frome-Solent, which gaining power by the shortening of its passage to the sea, has worked back and captured the drainage of Salisbury Plain. I do not know if he mentioned this Alderbury Mottisfont valley, but his authority seems to bear out my previous assumption that all that system the upper Avon, Wylye, Nadder, and others that unite near Salisbury once passed by this route into the Test. The lie of the Avon valley sides still seem to show some vestiges of the "col" which once formed the watershed of the head waters of the Avon at a point about a mile south of Downton.

It may be as well, partly by way of retrospect, to emphasize one or two points which must be borne in mind in searching for these

river movements and rivalries. An essential feature to be assured of is the inclination of the strata relatively to the run of the river. The *consequent* river, that which flows as might be expected down the dip of the series, will probably be the original stream, which may or may not, probably not, be now found at its full youthful extension. A river like the existing Frome or the lower Thames which is contained in a synclinal valley, the strata dipping towards it on either hand, is more likely to be in assured possession of its present territory. The rivers which gather upon the escarpments and flow down upon the underlying valleys, in the opposite direction to the Geological dip, will usually be the successful and increasing ones. Special causes for any enhancement of a river's activity should be sought for in the nature of the deposits over which it runs or in any shortenings of its route to the sea. Finally the past of a river must not be judged from the features of its present descendant. Shreds and vestiges of its former bed may often be found crowning the very heights which now enfold its valley. These generalities are one and all liable to considerable variation in detail, but are essential to bear in mind when approaching any investigation of this nature.

It is not proposed to allude specially to the phenomena accompanying the final incursion of the sea upon the Solent valley. The subject is one which has naturally been repeatedly dwelt upon in this locality, and has lately been set forth by Mr. Clement Reid, before the British Association. We have seen how the Hampshire Avon thus acquired enhanced power, and the use it made of it.

But there is a distinctly local feature which appears to be referable, in part at least, to the same set of causes. I allude to the curious series of remarkably steep little gullies—chines or bunnys as they are locally called—with which every little stream finishes its course into Bournemouth or Christchurch Bay. I have previously dignified these little ravines, which certainly form one of the picturesque elements of this coast, by the name of "gorges." But it is precisely the feature which distinguishes them from gorges as usually understood which forms their chief peculiarity. A true gorge owes its origin to its stream being confined by the nature of its rocky bed within a very narrow channel, and is moreover an episode of any part of the stream's course where the resisting rock happens to crop up. But our chines are one and all cut through the unrefractory sands and yielding clays of the upper Bagshot and Barton series. These same deposits certainly form a bluff sea cliff at first appearance, but this would seem to be chiefly due to the ease with which their fallen debris is washed away through the beach, thus giving no time for a sloping undercliff to form. Why then do not the various little rills—some are no more—enter the sea through valleys of modest contour, as one might expect and as in their upper courses they indeed possess? The Bourne itself has formed a more natural valley, but for the rest? In this question the best informed local opinion is not all at one. I propose therefore to adopt a compromise which has perhaps more of political convenience than logical sanction about it, and to confine my remarks to the "bunnys" east-

ward of the Avon, leaving the "chines" of Bournemouth to other interpretations.

Of these bunnys there are two. The first, which bears also the more grandiose title of "glen," is that at Chewton. The base of this bunny is not cut to the sea level but terminates in a cascade of some little height which is now artificially confined and supported. Its eastward neighbour at Becton, as I pointed out to a party of the

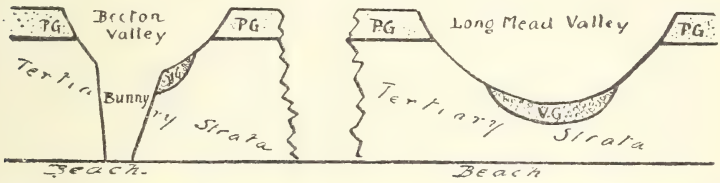


Fig. 3. To compare the valleys of Becton and Long Mead, Hordle Cliff,
P.G.—Plateau gravel, red.
V.G.—Valley gravel, white.

Society on a recent occasion, is worn well down to the beach, through which the little brook percolates to the sea. In both these cases there is a well-marked valley slope above, at the base of which the precipitous bunny is cut. The change from the gentle slope to the abrupt is quite sudden, is not referable to any change in the strata, and would seem clearly due to some sudden alteration in the conditions of the streams themselves. The outline of the sea-front of Becton Bunny, as shown in fig. 3, though not drawn to any scale, which is not the purpose of the diagram, shows quite truthfully this abrupt change. It can only be actually seen from a boat a short distance out from shore.

The most reasonable interpretation appears to be as follows. The destruction of the old Frome-Solent valley by the lateral incursion of the sea must, as soon as the process had reached the

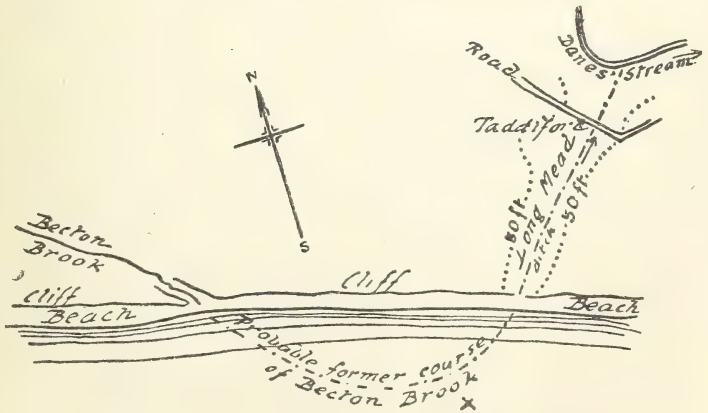


Fig. 4. Sketch Map of Becton and Long Mead.
X.—Point of intersection of central lines of the two valley .

northern slope of the valley, have resulted in the appearance of a sea-cliff of growing height as the land retreated. Any stream which meandered down the northern slopes in direct or devious passage to the vanished river would thus either progressively or suddenly be cut by the new cliff edge. Its course would then at once terminate in a perpendicular cascade. The lip of the waterfall, no hard rock intervening, would speedily wear away and the rate of the falling waters greatly increase. Their cutting power upon their bed must then vastly exceed in effect that of the subaerial denuding agents upon the valley slopes. The only result can be the formation of a deep ravine scarcely wider than the stream itself. The whole process in the case of such little streams would be short enough. It must end with the reduction of the bunny to sea-level when all the power of the water ceases. Exactly in this condition do we find Becton to day.

It is not quite so at Chewton, there being, as noted, still a cascade at the foot. The process here has been more gradual, and it is probable that this stream was absorbed by the sea foot by foot from its junction with the river. The bunny also is scarcely so precipitous as at Becton. In the latter case all the evidence seems to point to a sudden catastrophe of a different order to the Chewton event, and to one moreover of comparatively quite recent date.

The Becton in fact seems not to have been a direct tributary of the Frome-Solent, but to have taken a turn inland and joined the Danes stream, the Milford brook, at a point which there is a good deal of evidence to indicate to-day. The bunny does not run by any means at right angles into the sea, but, as a glance at the sketch map *fig. 4* will show, it is much inclined to the eastward. The central lines of the bunny and of the dry valley at Long Mead meet if produced at a point (*x*, *fig. 4*) only about 300 yards from the present cliff. This Long Mead valley slopes inland, not seaward, is broader and deeper than the Becton *valley*, and runs to the Danes stream which takes a sharp curve away at the point of junction (*v. fig. 4*). Both valleys are cut well into the tertiary strata and far below the red plateau gravel which crowns the cliff section. Each has a relaid and bleached deposit of this gravel, clearly the action of running water, easily distinguished by its colour and position, at its base. At Becton this gravel has been removed by the cutting of the bunny on the west side, but the deposit is clearly seen on the east slope. The cliff section at Long Mead shows it in its central position (*V.G. fig. 3*). This latter valley is now dry save for a water hole and a ditch which serves to show its downward slope inland towards the Danes stream. The dip where the road between Milford and Milton crosses this valley is called Taddiford—a name that may be as old or older than Domesday—where no *ford* now is or could be. On the western slope of Long Mead valley there are the remains of ancient earthworks, which whether Roman as they were formally classed or possibly more ancient, are situate at a point where no fresh water is now obtainable.

All these considerations seem to point to the very great likelihood that at no distant date the little Becton stream, running here

at a height of some fifty feet above sea level, took a turn from its south-easterly course to the north east, and joined the Danes stream beyond Taddiford. The retreat of the sea-cliff would then have cut into the stream at its most southerly bend. At once its lower course must become dry, and its bed in the lapse of a century or two, aided perhaps by agricultural operations, is to a great extent obliterated. Meanwhile the Becton Brook terminates in a fifty foot cascade with a lip of yielding clay. It is probable that the retreat of such a cascade up a mile or so of valley could have been followed in one lifetime.

The cutting of a nearly perpendicular ravine becomes in such circumstances almost inevitable. It remains for future generations to see the demolition of the sharp cut little bunny and the rounding off of its edges into the gentler valley slopes above. The waters have now practically lost all carrying power, so that the bed becomes more and more obstructed by fallen debris.

The whole of this phenomenon, which has now been followed somewhat minutely, is removed from the usual process of inter-river rivalry by the intervention of the sea. The old dry valley at Longmead nevertheless affords a good instance on a small scale of the kind of feature that may be sought for when a river head robbery is suspected. In chalk and limestone districts dry valleys are often referable to the collapse of underground channels. But a true river formed valley of the largest or most insignificant type has usually certain features—some out of many will usually be found remaining—which serve to distinguish it. It will usually be of winding form; its base at least in the lower courses will probably be flat—marking the old "flood-plain"; and especially it is likely to be found in following a winding valley that the lower slopes of the sides immediately above the flood-plain will be steep where their bend is concave to the valley and gentler where convex. A very perfect instance of this can be seen in the last two or three miles of the Lymington River right down to and beyond its present tidal limit. The steeper descent of Quay Hill at the foot of the steep High Street of Lymington marks the last of the concave sweeps. This is well below the present tidal limit, which formerly extended two miles further up the river than at present. But this marked evidence of purely river action clearly recalls the time when the Solent had no tides at all at this point. It requires only a glance at the Beaulieu river valley to be convinced of its purely fluviatile origin, and that the salt water is merely an interloper within its wooded curves.

The inference here is more obvious than at Lymington. But when we pursue our way still further eastward down the old Solent valley we must be struck by the varying character of its northern affluents. Lymington and Beaulieu are at least comparable, but what shall we say of the straight-cut Southampton water, to the making of which the Test and the Itchen have mainly contributed? It is perhaps fair, having regard to its main direction and to what we have already seen of its former magnitude now reduced by the Avon, to consider the Test as the predominant partner in the business of cutting this great waterway. However that may be its

remarkable straightness seems to distinguish it from any mere river formation. But it is probable this is only a feature induced upon the lower Test by geological causes. At this point the strata are rising towards the north-east as they approach that boundary of the Hampshire basin, and their "strike" runs in quite remarkable parallelism with the line of Southampton water.

It seems as though the lower Test had taken advantage of the outcrop of some specially yielding bed of the Barton series, which resulted in its following the line of that outcrop or strike, without deviation. The Lymington and Beaulieu rivers are also "strike streams." These two have both some noticeable features. The Lymington occupies the line of a subsidiary anticline within the main Hampshire syncline, and thus reproduces a well-known geological phenomenon, namely that what the forces of elevation would make a hill actually appears as a valley, owing no doubt to the line of weakness and possibly fracture caused by the up-bending of the strata being taken advantage of by the first stream there forming. The Beaulieu river is remarkable for its stout defence of its small rectangular territory bounded by the Southampton water on the east and the Bartley water on the north. The Bartley almost receives no contribution at all on its southern side, the Beaulieu feeders advancing close to its main channel. This contest, which all lies near the road between Lyndhurst and Totton, deserves very close attention.

This Bartley water is the last western affluent of the Test, which, however, still has to receive on its eastern side the three strong additions of the Itchen, the Hamble, and the Meon (the Titchfield river). These are all dip streams (*consequents*). But passing south-westward to the promontory, barely four miles wide, between the Beaulieu and the Southampton water, we find in this narrow strip two more "strike streams" which flow to the Solent and keep in independence of both their greater neighbours to east and west.

The whole area is very remarkable in its drainage, and must be studied carefully with the lines of dip and outcrop. It certainly seems at all events as though the Bartley water, which flows as an *obsequent*, up the dip, had been in part at least captured from the Beaulieu by the Test. But which way is the struggle now tending? Is not the Beaulieu recovering her own?

The endeavour has now been made to indicate some of the lines on which river investigation may be carried out, and examples, largely local, have been called in evidence. Though perhaps not strictly a geological enquiry, yet it must never be forgotten that physical geology forms its basis. Especially the careful examination of gravel deposits with a view to the sources of their constituents and their mode of deposition forms an essential part of the complete study. But in the first place general ideas can be foreshadowed and perhaps a working hypothesis formulated (however liable to be later discarded) by an examination of a good map giving the larger contours, such as Bartholomew's half-inch, in conjunction with the one-inch geological survey sheet. The one will be found to be the

complement of the other, and each is indispensable. Many a country ramble—or "scramble" is often the more accurate term—may thus develop into an interesting physical enquiry. And it is wonderful how the miles, and, alas! the hours are thus eliminated.

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## Remarks on Psilopleura hæmasoma. D. Jones.

By W. Parkinson Curtis, Esq., F.E.S.

*(Read the 16th day of March, 1912, and revised subsequently).*

This insect which I had described and named early in 1910 was, I was informed by Sir George Hampson, identical with an insect described as Psilopleura hæmasoma by Mr. E. Dukinfield Jones, but the description had not, when I read my paper to the Society, been published. I have not yet had the good fortune to come across the published description in the course of my reading and accordingly I am unable to refer to the description by Mr. Dukinfield Jones. I have suppressed my own intended name as I did not wish to pile up synonyms; moreover, Sir George Hampson told me that Mr. Dukinfield Jones had a number of specimens before him of both sexes whilst I had only a single female; he was therefore in a better position to characterize the species than I was.

For the clear understanding of what follows reference to the Catalogue of the Lepidoptera Phalaenæ (Sir G. F. Hampson) Vol. 1 should be made, as the cost of illustrating throughout with figures is prohibitive, and the above mentioned work is in the Bournemouth Public Library and accessible to any member of our Society.

By reference to the plate here given and the figures in the before mentioned work it will be seen that the following characters of the family Syntomidæ are exhibited.

(i) Hindwing with cell emitting less than 6 veins.
Contrast with *Hepialus lupulinus* the Common Swift which emits more than 6.

(ii) The antennæ are not clubbed.
Contrast with antennæ of *Pieris brassicæ* the Cabbage White butterfly (I must admit that the only part I had of the antennæ was a fragment of about 25 annuli but the facies of the insect is heterocerous).

(iii) Hind wing vein 1 c absent.
Contrast with *Coccus lignaperda* the Goat moth.

(iv) Forewing with vein 5 nearer 4 than 6.
Contrast with *Sphinx ligustri* the Privet Hawk moth.

(v) Hindwing with vein 8 aborted.
Contrast again with hindwing of *Sphinx ligustri* in which the vein is present and robust.

(Any member who cares to take the trouble to strip the wings of the above common insects I have cited by the methods suggested in Comstock's Manual will be able to see these distinctions very clearly and will besides derive considerable useful knowledge on the variation of wing structure as an aid to classification.)

The generic characters displayed are as follows :—

(i) Hindwings with 6 and 7 not coincident.
(I have in giving this resumé of the generic characters as tabulated by Sir G. F. Hampson referred to his figures since specimens themselves for actual study are not easily procured.)
Contrast *Ceryx pleurosticta*, p. 35, fig. 16.

(ii) Hindwings with 5 obsolescent from the angle of the discocellulars.
Contrast *Leucopleura cucadma*, p. 424, fig. 224.

(iii) Hindwings 3 coincident with 2.
Contrast *Chlorosostola corydon*, p. 428, fig. 228.

(iv) Forewing with vein 10, stalked with 7, 8 and 9.
Contrast *Orcynia calcarata*, p. 154, fig. 66.

(v) Abdomen without lateral tufts on last segment.
Contrast *Eurota hermione*, p. 286, fig. 134.

(vi) Abdomen not constricted near the base.

When originally working at this insect it was at this point that I parted company with the table. The specimen I possess has a most decided constriction and I have drawn it as it appears. It is of course perfectly possible that this constriction is due to the way in which my individual specimen dried, but as it was all the material I had I failed to place it correctly. I considered that it approximated *Pompiliodes* Hampson, but it differed markedly from that genus since 3 was entirely absent from the hindwings. A glance at *Pseudosphex*, p. 154; *Bombopsyche*, p. 161; *Sphecosoma*, p. 57; *Pompiliopsis*, p. 161, and *Pompiliodes*, p. 162, will show that the four first mentioned genera have an extremely constricted abdomen to enable them to copy faithfully their hymenopterous models, whilst in *Pompiliodes*, especially *aliena Wlk*, fig. 163, this constriction is so little pronounced as to be hardly noticeable. However, in *Pompiliodes* 3 is, as I have said, present in the hindwings which it is not in *Psilopleura*. A glance at the figures of Psilopleura, viz: fig. 121, and plate x, fig. 6 and 8, shew that whilst 2 have a normal abdomen the third has a somewhat constricted base if not an actual constriction near the base; this species *P. sanguipuncta* Hampson seems very close to my species.

(vii) Antennæ with shaft not dilated.
Compare fig. 121 with *Eunomia colombina*, p. 201, fig. 95, and *Homoecera lophocera*, p. 166, fig. 79.

(viii) Thorax smoothly scaled.
Contrast *Dasyphinx mucescens*, p. 188, fig. 88.

(ix) Hindwing 6 and 7 from cell.
Contrast *Paramya intersecta*, p. 164, fig. 77.

(x) Hindwing with disocellulars angled.
Contrast *Pheia albisigna*, p. 205, fig. 97.

(xi) Hindwing with 2 and 4 from angle of cell or shortly stalked.
Compare *Mimagyrta pampa*, p. 206, fig. 98.

(xii) Hind tibiæ and tarsi naked.
Compare *Pseudomya minima*, plate x, fig. 7.

(xiii) Forewing with vein 6 from below upper angle of cell.
Compare *Saurita tristissima*, p. 273, fig. 126.

(xiv) Forewing with vein 5 from lower angle of cell.
Confer *Hypatia delecta*, p. 267, fig. 120.

It will be observed the 4 and 5 of the forewing in *Psilopleura* practically meet at the base.

The specific characters are easily tabulated since there are but three species in Sir G. Hampson's Catalogue, and I have not yet come across any more than the one to which I am addressing my remarks.

| | |
|---|---|
| 1—Abdomen with lateral orange stripes ... ... | 2. |
| Abdomen without such stripes ... ... | 3. |
| 2—Hindwing with inner area dark orange at base, the base of costa orange below ... ... | vittata. |
| Hindwing with the inner area and base of costa below whitish ... ... ... .. | polia. |
| 3—Abdomen black brown ... ... ... ... | sanguipuncta. |
| Abdomen fulvous brown, scarlet lake laterally... | hæmasoma. |

## Detailed Description.

Expanse, 25 mm.

*Antennæ* (fragmentary see above,) basal joints tubular; upper part of shaft composed of suboval joints truncated and bicuspidate anteriorly, each cusp normally emitting a fine bristle. There are other bristles on most of the annuli.

*Palpi.* Basal joint curved upwards, stout, well-clothed with large scales; second joint not so long as basal joint, directed upwards and forward more sparsely clothed with scales. Third joint small, not quite half as long as the second joint ellipsoid, slightly scaled with a terminal tuft of fine hair.

*Legs.* Well developed foreleg with a single median tibial spur, a pair of well-developed claws, paronychia and pulvilli; median legs with a weak pair of terminal tibial spurs, a single large pectinated claw, a pair of bristles and pulvilli; posterior legs with moderately developed median and terminal pairs of tibial spurs, tarsus armed with small spines, a pair of claws and a paronychium.

*Wings.* Forewings strongly built with thickish fabric and powerful nervures; long and narrow. Costa medially slightly inarched, apically strongly arched, apex fairly acute (costa, 11 mm.)

Termen apically excurved, medially incurved; dorsum, shorter than costa being 7.5 mm. making tornal angle obtuse, very slightly excurved.

Hindwings, costa long, nearly straight, apex acute; termen long excurved from apex to vein 2 and then medially slightly incurved; tornal angle very obtuse, dorsum short, nearly straight.

Neuration :—

Forewing. 1, simple at base, reaching tornus; 2, rising 4-5ths of cell to termen well away from 1; 3, from near end of cell; 4, from lower angle of cell, nearly straight to termen; 5, rising close to 4, upcurved, and then parallel to 4; 6, from upper discocellular close to, but below upper angle of cell to termen; 7, 8, 9 and 10 stalked; 7 rising from 8 posteriorly to 10 anteriorly to 9 to termen just below apex; 8 to costa above apex; 9 from 8 anteriorly to 7 to costa; 10 from 8 posteriorly

to 7 and 9 to costa; 11 from cell close to extremity; 12 to costa, beyond rise of 11, in fact 12 reaches costa at end of cell; discocellulars almost obsolescent at junction.

Hindwing. 1 rising free to tornus; 2 and 4 connate at base or very shortly stalked both to termen; 3 and 5 absent; 6 and 7 connate at base; 6 to termen below apex; 7 to costa 8 absent. Upper and lower discocellulars present but practically obsolete at junction. *N.B.*—In the scaled imagine a line of rather strong scales marks site of 5 which is absent. The scaling of the wings shews decided signs of degeneracy, the scales being scattered in point of numbers and reduced in point of size, very often mere hairs.

*Abdomen.* Contracted at base, with the lower part of the second segment and the third constricted (but see remarks above).

*Coloration.* Legs, dark ochreous brown above and below; head and palpi, dark ochreous brown; collar, brown with two scarlet lake dots on it; patagia, dark brown edged with crimson; thorax, dark brownish ochreous posteriorly with two scarlet lake spots and a central white mark; abdomen above with basal segment dark brownish ochreous, with lateral white marks of small size, the remaining segments brown with a broad lateral stripe of scarlet diminishing posteriorly, terminal segment entirely brown; abdomen below with basal half scarlet posterior half brown.

Forewings. Sparsely covered with light reddish brown scales, an inconspicuous darker clouding at base, a quadrate light lemon yellow semihyaline spot at the extremity of the cell preceded and followed by a sprinkling of darker brown scales. Hindwings semihyaline with scaling the same brown as the forewings. Most heavily scaled on the terminal portion, fringes brown, underside of both wings uniform brown.

Sex: female.

Locality: South America; the balance of evidence is in favour of Penãrol near Monte Video. Captor: Eva Hudson, formerly of Penãrol, now of Parkstone, Poole.

No. of specimen in my collection, 8650. No. of microscopic mounts of portions, 42; 46; 47; 49; 57; 58.

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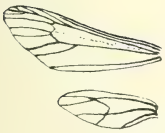
Explanation of Plate.

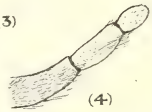
1. Neuration (enlarged).
2. Psilopleura hæmasoma × 2.
3. Head.
4. Palp.
5. Posterior leg.
6. Median leg.
7. Anterior leg.
8. Portion of antenna.



(1)

(2)
magnification X2

(3)



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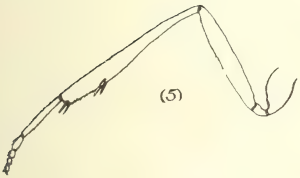

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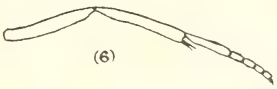

(6)

(7)

(8)

NATURAL HISTORY

# Photography: Its Aims and Methods.

By E. W. Barlow, Esq., F.R.A.S.

*(Read before the Photographical Section on December 1st, 1910).*

Although the title of this paper is a somewhat wide one, I have had a very definite idea in mind while writing it, viz., to review the different types of photography as they exist among us to-day, to define clearly their separate aims and to take some general notice of the methods by which these aims are achieved.

When photography was first introduced its marvellous powers of rendering detail and its ability to copy exactly the objects placed before the camera excited unbounded admiration, as well they might do. Since that time each ensuing year has witnessed the extension of the uses of photography in ever-widening fields of scientific and technical knowledge, until we can now hardly imagine modern life without it.

During this period but chiefly within the last thirty-five years, a movement, consisting of a departure from orthodox methods of photographic procedure and having for its object the employment of the medium as a means of artistic expression, has arisen, slowly and doubtfully at first, but gradually gaining strength as it felt its way, so to speak, until it resulted in what is known as artistic or pictorial photography.

Photography therefore has now two quite separate and totally distinct aims and I wish to emphasise clearly their divergence and to explain as far as possible the characteristic qualities of each. The twofold nature of modern photography is illustrated by the appellation of "the art-science" which it has received.

It is of the utmost importance that all who take up photography should fully recognise this difference and of what it consists. Otherwise their work will fail by falling between the two stools. The two great aims of serious photography are (1) Record and scientific work, (2) Artistic work. I need not dwell on either the nature or utility of the former, that is, of the exact and detailed copying of objects, places and operations.

Every branch of science owes a great debt to photography, finding its co-operation invaluable. In many instances, notably in astronomy, actual discoveries have been made by its means, some of which could not otherwise have been achieved at all. The value, also, of the records of daily life in our books and papers can hardly be over-estimated, either from the standpoint of ourselves or of posterity.

In considering the other definite branch of photography, in which the camera is used as a means of artistic expression, I cannot do better than repeat the following words, written by Antony Guest:—"To set forth the distinction in a simple way between the artistic and inartistic in photography it may be said

that the one is a representation of the sentiment of a scene, while the other merely illustrates the shapes of the separate objects that it embodies." This applies not only to photography but to all other branches of pictorial art. In referring to photography which expresses no artistic sentiment as inartistic it must be plainly understood that no slur is cast upon the other great branch, viz., record work. For all artistic work could be described as bad from the point of view of the scientific record. No two things which have distinct aims can be strictly compared in relative value and the point of view of him who can only realise the value of one of them is necessarily one-sided and incomplete. To realise the artistic aim there must be the effect in the result of the intervention of a human temperament, of a human soul. Art is the manifestation of an emotion. "The beginning of real art is reached when one begins to see and to record so that others can see, something beyond the mere physical facts, some hints of the inner, mental or spiritual quality. At this stage we realise that the subject is merely a means to an end." In record or scientific work, the subject is the end itself. Therein lies the distinction. "Art is the creating by artificial means of a something which shall give rise to pleasurable thoughts, a something which is not Nature yet is drawn directly from Nature, a something which while not the material thing, is greater than the reality, for it is the essence, with all dregs eliminated." "Pictorial ability," in short, "depends upon the power to see beyond the obvious."

The artist sees the spirit of a scene, it may be some beautiful play of light, a human emotion, or the glamour of its former grandeur which hovers round some ancient building, and he endeavours to use the powers of his medium to represent the scene, not as it would have appeared to the purely scientific observer in all its detail, but in such a manner that a receptive or sympathetic beholder shall have emotions stirred within him similar to those which attracted the picture-maker. The greater this appeal to the beholder the higher is the artistic merit of the picture. This statement is general and is the criterion by which all pictorial art must be finally judged. Of course since art depends on the emotions, it is a matter, to some extent, of individual taste, feeling and perception ; some subjects will appeal more to certain people than others. I have said "receptive beholder." It is characteristic of a work of art (as opposed to a scientific or record photograph) that the beholder must bring something to it as well as the producer. Something must be left to the imagination of the former. If he be insensitive to some or all forms of artistic appeal, pictures, or a large proportion of them, will have no meaning for him.

What, then, is the position of our Photographic Section with regard to these two photographic aims ? Since we exist as a portion of a science society it is but natural that we should have scientific and record photography as an aim. I do not say, as an only aim or even a chief one, for the following reason. Although pictorial and record results, when good of their kind, are widely different in character, yet they meet upon the vast common ground of photo-

graphic technique. It seems paradoxical, but is an undoubted truism, that for good pictorial work it is necessary to have a far greater knowledge of, and command over, the technical part of the work than suffices to produce excellent records. Never antagonistic, but supplementary, the two kinds of photography have much in common.

To make a good record photograph we use the finest lenses and apparatus that we can command and choose a printing process that will give as much detail as possible, shown in the clearest way. Orthochromatic or panchromatic plates and suitable screens should be used to give the truest colour rendering in monochrome, otherwise our record is imperfect. No handwork of any kind is permissible on negative or print, save perhaps the removal of pinholes. To make perfect records, the only other technical accomplishment necessary is the power to increase the contrasts, in development and printing, of a subject taken under flat conditions of lighting, and to decrease the contrasts, by similar means, of one that is harshly lit, since the subject cannot always be obtained under ideal conditions of lighting.

For artistic work it is necessary not only to be able to make uniformly good negatives and prints but to ring the changes as we desire and as best suits the subject, to produce a result in a high key or in a low key at will, to emphasise some parts and suppress others, to select and to reject, to choose the printing process, colour and surface of print, the mounting scheme and numerous other details which together make the result a success, a harmonious and unified whole. The individuality with which such means may be employed is demonstrated by the ease with which one who has a moderate acquaintance with the works of the masters of artistic photography can pick out new works of theirs and name the authors, just as is possible in the case of good paintings. In record photography there can be no individuality.

The not uncommon idea that a picture must be diffuse and indistinct to be artistic is quite erroneous and any excess of diffusion over that necessary in many cases to give "breadth," that is, to subjugate unrequired and distracting detail, is detrimental.

A few further remarks may conclude this very brief outline of a very large subject. Scientific or record photography is of little or no direct interest to anyone who has no knowledge of, or enthusiasm for, the particular branch illustrated. Pictorial photography is of wider interest because its appeal is to the heart rather than to knowledge. Any attempt to define the relative value of the two is, however, much too intricate to be possible and is, I may add, quite unnecessary. It is well for all photographic workers to realise this, especially where, as in our own Section, both aims are pursued side by side. It is perfectly possible, if not very usual, for the same person to work along both lines, keeping the results separate, but using his technique in common.

In conclusion I ought to mention a class of photograph, common enough, which at first sight seem to fall under neither of the two great headings described. It consists of mementoes, generally of

remarkable or beautiful buildings or scenes, frequently showing the presence of the photographer's friends or relations, and which form pleasant reminiscences of travel. Now these constitute a branch of record work, domestic records, as distinguished from those of more strictly scientific and technical, that is, more general, interest. They may partake of some of the qualities both of record and pictorial work, but are seldom of much interest save to those concerned and their friends.

Leaving this personally interesting type out of the question, those who use photography to produce results of general interest or value must clearly keep in mind throughout their work the fundamental differences between the two great kinds of photography, which have entirely different aims, and the issues of which must not be confused.

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# The Graphic Solution of Problems relating to the Laws of Boyle and Charles.

By Hubert Painter, B.Sc., F.C.S.

*Read before the Physical Section, June 10th, 1911.*

The laws mentioned in the title of my paper may be stated in words as follows:—

*Law of Boyle.* The volume of a given mass of gas, kept at a constant temperature, is inversely proportional to the pressure upon it.

*Law of Charles.* The volume of a given mass of gas, kept at a constant pressure, is directly proportional to its absolute temperature.

Absolute temperature is reckoned in degrees centigrade from the absolute zero of temperature, which is believed to be very near $-273^{\circ}$C.

The usual algebraic statement of the two laws is

$$VP = RT.$$

The laws only hold with mathematical accuracy for an abstraction known as a perfect gas, but they are very nearly true for a large number of gases through a considerable range of temperatures and pressures.

In what follows I shall not deal with the departures of actual gases from the laws.

Most text-books of Chemistry and Physics give curves of two kinds, called isothermal and adiabatic respectively, such curves being plotted either from the results of experiments or from calculation, but I have never met with any directions for the solution

of actual problems by graphical methods. This paper is intended to suggest methods for obtaining such solutions.

FIGURE I (Boyle's Law).—Draw two lines OX and OY at right angles. Suppose we have a mass of gas whose volume is $V_1$ at the pressure $P_1$. Take OA to represent $V_1$ and OB to represent $P_1$. Also take $AA_1 = OA$ and $BB_1 = OB$. Join $A_1 B_1$ and through A and B draw lines parallel to OY and OX meeting each other and $A_1 B_1$ at the point Q. Now $AA_1$ represents $V_1$ and $BB_1$ represents $P_1$. Take $BB_2$ to represent any other pressure $P_2$. Join $B_2 Q$ and produce it to meet OX in $A_2$. Then, as will be easily seen from the similarity of the triangles, $B_2 BQ$ and $QAA_2$, $AA_2$ represents $V_2$, the volume under the new pressure $P_2$.

We can easily obtain from this construction any desired number of points on an isothermal curve. Along OX and OY (FIGURE II) take OA and OB to represent the volume and pressure of a mass of gas, say that which occupies unit volume at unit pressure. Draw lines through A and B parallel to the axes and let them intersect at $O^1$. Take any number of points $B_1$, $B_2$, $B_3$ ..... along OY, their distances from B representing various pressures, and draw lines from them through $O^1$ cutting OX at $A_1$, $A_2$, $A_3$ ..... The distances of these from A will represent the corresponding volumes. By drawing vertical lines through each of the "A" points and horizontals through each of the "B" ones we obtain a series of intersections $Q_1$, $Q_2$, $Q_3$ ..... which will be points on a PV curve whose axes are $OX^1$ and $OY^1$. By taking enough of these and drawing a smooth curve through them we obtain the isothermal we want.

FIGURE III (Law of Charles).—Take axes as before and let $OA_1$ represent the volume of a given mass of gas under any assigned (constant) pressure and at an absolute temperature represented by $OB_1$. Join $A_1 B_1$. If $OB_2$, $OB_3$, etc. represent other temperatures on the absolute scale the corresponding volumes will be found by drawing through $B_2$, $B_3$, etc. lines parallel to $B_1 A_1$ and cutting OX at the points $A_2$, $A_3$, etc. Then $OA_2$, $OA_3$, etc. represent the volumes required.

FIGURE IV. (Boyle's Law). —An alternative method for finding the volume corresponding to any assigned pressure or conversely, *i.e.*, for problems in Boyle's Law, is shown in Figure IV. Let $OA_1$ be the volume corresponding to the pressure $OB_1$. It is required to find the volume corresponding to the pressure $OB_2$. Join $A_1 B_2$ and through $B_1$ draw a line parallel to $A_1 B_2$ cutting OX in $A_2$. Then $OA_2$ will represent the required volume. This is evident from the similarity of the triangles $OB_1 A_2$, $OB_2 A_1$, in which

$$OA_2 : OA_1 = OB_1 : OB_2$$

*i.e.*, the volumes are inversely as the pressures. In like manner if $OB_3$ represent a third pressure and it is required to find the corresponding volume, we join $A_1 B_3$ and through $B_1$ draw a line parallel to $A_1 B_3$ cutting OX in $A_3$. Then $OA_3$ represents the

required volume. The method of Figure III for the Law of Charles may be combined with either of the methods for the Law of Boyle, Figures I and IV.

FIGURES V and VI show how this can be done. Each is arranged to give a solution to the same definite problem, *viz.*, "To find the volume at N.T.P. of a mass of gas which at 72 c.m. and 35° c. occupies 1,000 cubic centimetres."

FIGURE V.—Take OA, OB, OC to represent 100 c.c., $(273+35)°$, and 273°, respectively. From C draw CD parallel to BA. Take OE, EF to represent pressures of 72 cms. and 76 cms. respectively. Through D draw a vertical and through E a horizontal line and let them meet in P. Join FP and produce it to meet OA produced in the point X. Then DX represents the volume corrected for both temperature and pressure.

FIGURE VI.—Take OA, OB, OC to represent 100 c.c., $(273+15)°$, and 273° respectively. Through C draw CD parallel to BA. Then OD represents the volume corrected for temperature only. Take OE, OF to represent pressures of 72 and 76 cms. respectively. Join DF and through E draw EX parallel to FD, cutting OA in X. Then OX represents the volume corrected for both temperature and pressure.

*N.B.—The accompanying figures are reductions of those shown when the paper was read. The scales specified are those of the original diagrams.*

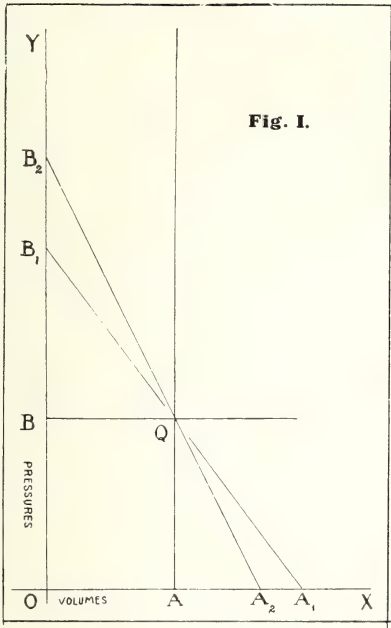


**Fig. I.**

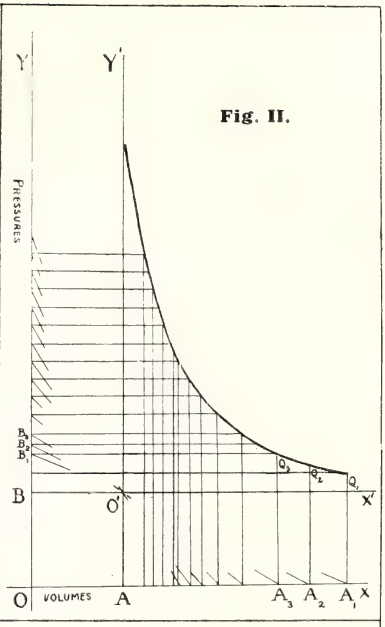


**Fig. II.**

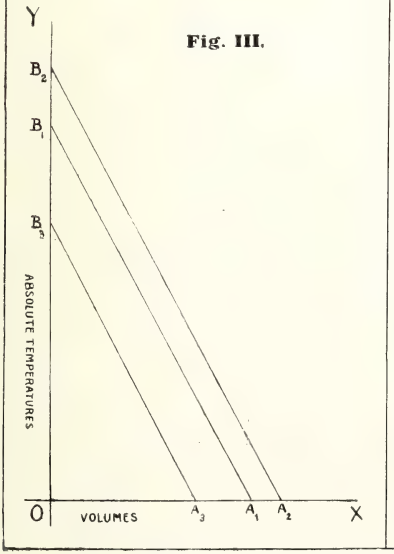


**Fig. III.**

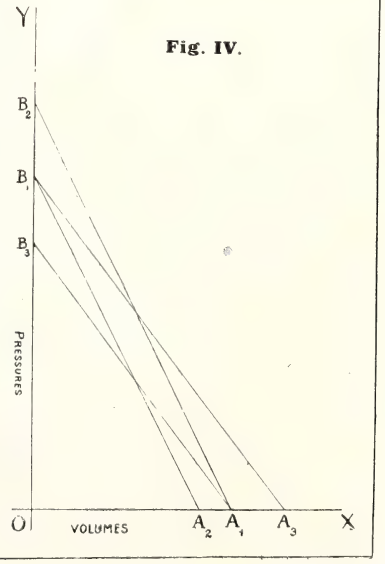


**Fig. IV.**

NATURAL HISTORY

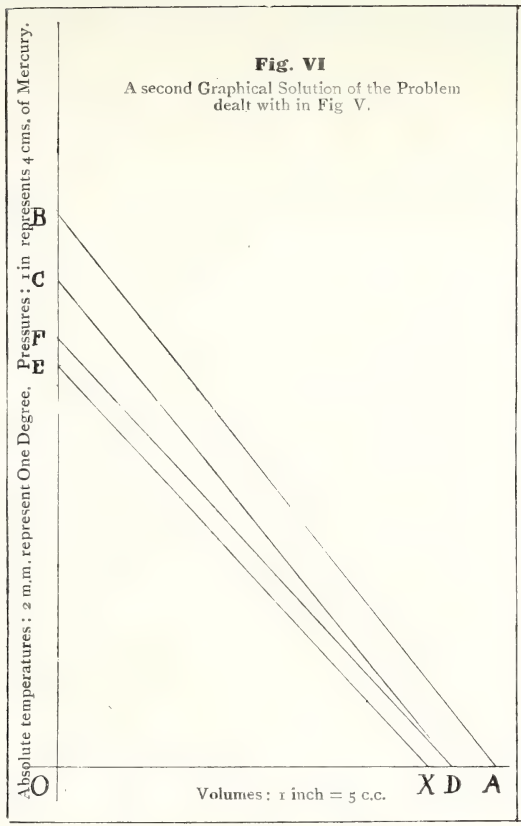


**Fig. VI**

A second Graphical Solution of the Problem dealt with in Fig V.

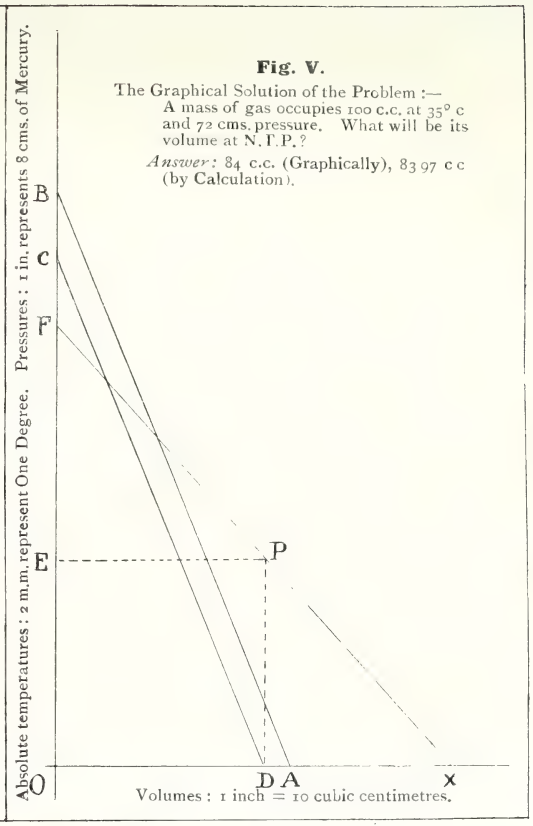


**Fig. V.**

The Graphical Solution of the Problem :—
A mass of gas occupies 100 c.c. at 35° c and 72 cms. pressure. What will be its volume at N.T.P.?

*Answer:* 84 c.c. (Graphically), 83 97 c c (by Calculation).

BRITISH MUSEUM
NATURAL HISTORY

# Guide to the Fungi and Mycetozoa of the New Forest.

By J. F. Rayner, F.R.H.S.

## *PREFACE.*

The first edition of this List, issued in 1904, comprised 560 Fungi and 11 Mycetozoa; since then 133 Fungi and 39 Mycetozoa have been recorded, bringing the total numbers up to 693 and 50 respectively. In addition, habitats and many fresh localities are now included; the meanings of the botanical names are given, showing how apt and characteristic very many of them are; definitions of the divisions and sub-divisions in which Fungi are classified are inserted in their proper places, the classification and nomenclature being revised according to the most recently accepted ideas; distinguishing features of species are appended when they can be expressed briefly; frequency is estimated in all cases; and edibility or otherwise is noted.

It is hoped that these particulars will facilitate the study of these fascinating organisms in this incomparable hunting-ground, and lead to many new records. It should, however, be pointed out that these additional details are confined to the Basidiomycetes, this great and important class including all or nearly all the kinds that attract the beginner and the non-botanical—exigencies of space prohibit their extension to the remaining classes. But the student will in any case require much further information before he will be in a position to identify many species or become acquainted with their nature and affinities. Fortunately we now possess a handy text-book that will meet all his requirements, in Massee's *British Fungi* (Routledge, 7/6). For the Mycetozoa all that is needed will be found in Lister's *Guide* (3d., post free 4½d., British Museum, South Kensington). Nevertheless, it is hoped that the details given in this List will make it helpful as a pocket companion in rambles in the Forest; indeed, as the kinds which prevail there are, in the great majority of cases, found in other districts, it may even claim a wider utility.

Organised investigation of the fungus-flora of the New Forest began in 1887, when the Hampshire Field Club, at the instance of the Rev. W. L. W. Eyre, M.A., Rector of Swarraton, who has done so much for the mycology of his own part of the county, held the first of their annual fungus forays. In 1899 the British Mycological Society visited our great woodland for a six days' search. Since then the local scientific societies have taken up the enquiry continuously, and individual work has been done by the present writer. Some of the leading authorities in the country—Dr. M. C. Cooke, M.A., A.L.S., M.V.H., Mr. George Massee, F.L.S., Mr. Carleton Rea, B.C.L., M.A., Hon. Secretary of the British Mycological Society, the late Dr. Plowright, and others—have taken part in these meetings;

and in all cases doubtful or critical species have been submitted to one or other of them. The augmented list of Mycetozoa is also largely due to the visits of such experts as the late Arthur Lister, F.R.S., Miss G. Lister, F.L.S., President of the British Mycological Society, Mr. J. Saunders, A.L.S., and Mr. W. N. Cheesman, F.L.S.

Among the rarer or more noteworthy New Forest species, some of which are first records for Britain, are *Tricholoma pes-caprœ* Fr., *Mycena rubro-marginata* Fr., *Pleurotus atrocœruleus* Fr., *Cantharellus cinereus* Fr., *C. lutescens* Fr., *Pluteus pellitus* (Pers.) Fr. var. *punctillifer* Quél., *Crepidotus epibryus* Fr., *Cortinarius orichalceus* Fr., *C. triumphans* Fr., *C. camurus* Fr., *C. myrtillinus* (Bolt.) Fr., *C. orellanus* Fr., *Hypholoma storeum* Fr., *Coprinus Friesii* Quél., *Boletus rubiginosus* Fr., *B. purpureus* Fr., *B. æreus* Bull., *Trametes multizonatum* B. and Br., *erinaceum* Bull., *H. Queletii* Fr., *Stereum rubescens* Fr., *Hydnum Sparassis laminosa* Fr., *Pilacre faginea* B. and Br., *P. Petersii* B. and C., *Rhizopogon rubescens* Tul., *R. luteolus* Tul.

The compiler will be glad to receive and report on any specimens of fungi posted to the undermentioned address. They should be wrapped separately in soft paper (grocer's greaseproof paper in the case of adhesive kinds), and packed fairly tightly in boxes, preferably of wood or tin.

J. F. RAYNER.

Highfield, Southampton,
December, 1911.

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# FUNGI.

Spore-plants devoid of chlorophyll.

## Class I. BASIDIOMYCETES.

Spores borne on supports termed basidia.

### Order I. *HYMENOMYCETES.*

Spores exposed before maturity.

#### Family I. AGARICACÆ ("Gill Fungi").

Spore-surface folding in radiating gills.

##### Series I. LEUCOSPORÆ.

Spores white or whitish.

###### Division I. *Molles.*

Fleshy, putrefying.

Genus 1. **AMANITA** Fr. (*Amanitai* were certain fungi found on Mt. Amanus, in Cicilia). Gills free, volva and ring present.

**A. virosa** Fr. (Lat. poisonous).
Rhinefield. Queen's Bower.
In moist woods. Not common. Poisonous. Entirely white.

**A. phalloides** Fr. (Lat., like *Phallus*, from the smell).
Buskett's Lawn. Denny. Dearleap Plantation. Holidayshill.
In woods. Not uncommon. Very poisonous. Characterised by the free volva, and pileus usually tinged primrose or greenish. Early summer to late autumn.

**A. mappa** Fr. (Lat., a napkin).
Church Place Inclosure. New Copse. Burley. Busketts. Hollands Wood. Holmsley. Ridley Wood. Woodhurst. Tantany Wood, etc.
In woods. Common. Very Poisonous. Distinguished from *A. phalloides* by its oblate and close-cut volva.

**A. muscaria** (Linn.) Pers. (Lat., *musca*, a fly; fly-papers were formerly made from it). "Fly Agaric."
Woodfidley. Dearleap. Costicles. Hollands Wood. Burley. Woodhurst. Mark Ash. Holmhill. Pig Bush, etc.
Under birches. Common. Very poisonous. Universally admired for the splendour of its scarlet, white-spotted pileus.

**A. pantherina** (DC.) Fr. (Lat., spotted like a panther).
Ramnor. Bank. Denny. Bolderwood. Church Place Inclosure.

Early. Like *A. rubescens*, but pileus grey, gills and stem unchangeably white.

Genus 2. **AMANITOPSIS** Roze. (*Amanita* and Gr., *opsis*, like.) Gills free, with volva, but without ring.

**A. vaginata** (Bull). Roze (including var. **fulva** Schaeff). (Lat., with a sheath).
Queen's Bower. Hollands Wood. Burley. Bolderwood. Vinney Ridge. Ridley Wood. Holmhill. Busketts, etc.
In woods. Very common, especially var. *fulva*. The latter is stated by some good authorities to be poisonous, but we have found it wholesome and delicious.

Genus 3. **LEPIOTA** Fr. (Gr., *lepis*, a scale, *ous*, the ear, from the scaly epidermis of many of the species). Gills free, with ring, without volva.

**L. procera** (Scop.) Fr. (Lat., tall. "Parasol Mushroom."
Near Lyndhurst. Costicles. Denny. Church Place Inclosure. Ironshill. Aldridge Hill.
In woods and on commons. Frequent. Edible, excellent. Characterised by the transversely scaly stem and white flesh.

**L. rachodes** (Vitt.) Fr. (Gr., with surf or breakers, from the appearance of the cap).
Denny Wood.
In woods and under trees in pastures. Uncommon. Edible and of good flavour. If differs from *L. procera* in having a smooth stem and the flesh turning reddish when broken.

**L. excoriata** (Schaeff.) Fr. (Lat., stripped of its skin).
Queen's Bower. Hollands Wood.
In woods and on heaths. Uncommon. Edible.

**L. gracilenta** (Krombh.) Fr. (Lat., slender, thin).
Denny Wood.
In woods and heaths. Uncommon. Edible. Like *L. procera*, but smaller and more slender.

**L. clypeolaria** (Bull.) Fr. (Lat. with a boss in centre like a shield).
Denny Lodge Inclosure.
In woods. Rare. Suspected.

**L. carcharias** (Pers.) Fr. (Gr., a kind of sharp-toothed shark; from the ring). Bolderwood. Holmsley Inclosure.
In woods, especially under conifers. Not common.

**L. granulosa** (Batsch) Fr. (Lat., covered with granules).
Bolderwood.
In woods and on commons. Not common. Edible.

**L. amianthina** (Scop.) Fr. (Lat., of the colour of amianth, asbestos).
Rhinefield. Holmsley. Woodhurst. Tantany Wood. Dearleap. Ridley Wood. Holmhill. Mark Ash, etc.
In woods and pastures. Common. Edible. Yellow flesh.

Genus 4. **ARMILLARIA** Fr. (Lat., *armilla*, a bracelet). Gills attached, ring present.

**A. mellea** (Vahl.) Fr. (Lat., of the colour of honey).
Holmsley. Setley. Dearleap. New Copse. Burley. Denny. Aldridge Hill. Holmhill. Brockis Hill, etc.
In woods and on old stumps, often forming enormous clusters. Very common. Edible but not very palatable. A destructive parasite, causing "White Rot."

**A. mucida** (Schr.) Fr. (Lat., slimy). "Beech Disease."
Bank. Knightwood. Denny. Woodhurst. Tantany Wood. Ridley Wood. Mark Ash, etc.
On beeches. Very common. Pure white.

Genus 5. **TRICHOLOMA** (Gr., *trichos*, of a hair, *loma*, fringe, because the margin of the pileus generally bears traces of the universal veil.) Gills sinuate, stem fleshy, no ring or volva.

**T. equestre** (Linn.) Fr. (Lat., belonging to a knight; from its distinguished appearance).
Ironshill.
In fir woods. Rare. Cap yellow, tinged reddish. Gills yellow.

**T. sejunctum** (Sow.) Fr. (Lat., severed; from the separation of gills from stem).
Near Lyndhurst. Near Ashurst. Holmhill.
In woods. Not common. Edible. Differs from *T. equestre* in white gills.

**T. portentosum** Fr. (Lat., monstrous, wonderful).
Costicles. Brockis Hill. Denny.
In woods. Frequent. Edible. Cap dusky, with fine radiating streaks.

**T. spermaticum** Fr. (Lat., of the odour of sperm).
Near Lyndhurst. Holmsley Inclosure. Emery Down.
In woods. Not common. Poisonous. White, with stout, twisted, hollow stem.

**T. resplendens** Fr. (Lat., shining brightly).
Ramnor. Buskett's Lawn.
In woods. Frequent. Entirely white; resembles *Hygrophorus eburneus*.

**T. acerbum** (Bull.) Fr. (Lat., harsh to the taste, bitter).
Beaulieu Road. Buskett's Wood. Denny Lodge Inclosure. New Copse. Holmhill.
In woods. Not uncommon. Edible. Margin turned in, gills rusty.

**T. flavobrunneum** Fr. (Lat., yellow [flesh] brown [pileus]).
Brockis Hill. Whitley Wood. New Copse. Rhinefield.
In woods, etc. Frequent. "Edible" (Cooke). "Poisonous" (Rea). Strong smell.

**T. albobrunneum** (Pers.) Fr. (Lat., white and brown).
Buskett's Lawn. Denny. Ironshill. Holmsley. Ashurst. Brockis Hill. Mark Ash, etc.
In pine woods, etc. Common. "Not dangerous" (Cooke). "Edible" (Rea). Flesh white. No smell.

**T. rutilans** (Schneff.) Fr. (Lat., of a reddish glow).
Rhinefield. Denny. Busketts. Holmsley. Dearleap. Ashurst. Mark Ash. Aldridge Hill, etc.
On or near pine roots and stumps. Common. Suspected. Gills yellow, edged deep orange.

**T. columbetta** Fr. (Lat., dim. of *columba*, a dove).
Ramnor. Denny.
In woods. Uncommon. Edible. White, occasionally stained blue and red.

**T. imbricatum** Fr. (Lat., tiled ; perhaps from the colour).
Buskett's Lawn. Bolderwood. Church Place Inclosure. Holmsley.
In pine and other woods. Not uncommon. Edible. Resembles *T. albobrunneum* but is not viscid.

**T. vaccinum** Fr. (Lat., cow-like ; perhaps from the colour).
Ramnor.
Under pines. Rare. Differs from *T. imbricatum* in the unbonate cap and hollow stem.

**T. terreum** (Schaeff.) Fr. (Lat., earthy ; from the colour).
Rhinefield. Ramnor. Mark Ash. Church Place Inclosure. Ridley Wood. Denny Wood. New Copse.
In woods, especially fir. Rather common. Edible.

**T. saponaceum** Fr. (Lat., soapy ; from its odour).
Buskett's Lawn. Hollands Wood. Bank. Rhinefield. Denny. New Copse. Ivy Gutter.
In woods. Common. Flesh turns reddish when broken.
var. **squamosum** Cooke. (Lat., scaly ; referring to the stem).
Rhinefield.
In woods. Not uncommon.

**T. cuneifolium** Fr. (Lat., with wedge-shaped leaves, i.e. gills).
Brockis Hill. Ramnor.
In woods and pastures. Not common. Edible.
var. **cinereo-rimosum** (Batsch) (Lat., [Pileus] grey and cracked).
Buskett's Lawn.
In woods and pastures. Rare.

**T. virgatum** Fr. (Lat., striped ; from the hair-like streaks on the pileus).
Beaulieu Road.
In pine and other woods. Rare.

**T. sulphureum** (Bull.) Fr. (Lat., sulphur-coloured).
Buskett's Lawn. Church Place Inclosure. Denny.
In woods. Not common. Poisonous.

**T. lascivum** Fr. (Lat., playful ; from its many affinities, none of which are very close).
Ironshill.
In mixed woods. Rare.

**T. carneum** (Bull.) Fr. (Lat., flesh-coloured).
Denny Heath.
On heaths, pastures, etc. Uncommon.

**T. pes-caprae** Fr. (Lat., goat's-foot).
Near Lyndhurst.
Among grass, leaves, etc. Rare.

**T. album** (Schaeff.) Fr. (Lat., white).
Denny Wood. Ironshill.
In woods. Uncommon. Poisonous.

**T. nudum** (Bull.) Fr. (including **T. glaucocanum** Bres.) (Lat., naked ; from the margin). "Blue Caps."
Rhinefield. Brockis Hill. Ramnor. New Copse. Mark Ash.
In woods and thickets. Common. Edible and delicious.

**T. melaleucum** (Pers.) Fr. (Gr., black [cap] and white [gills]).
Rhinefield. Denny Wood.
In open places in woods, etc. Uncommon.

**T. grammopodium** (Bull.) (Gr., with lines on the stem).
Near Lyndhurst.
In woods and pastures. Rare. Edible.

Genus 6. **CLITOCYBE** Fr. (Gr., *klitos*, a declivity, *kybe*, head, from the decurrent gills characteristic of this genus). Stem fibrous outside.

**C. nebularis** (Batsch) Fr. (Lat., a cloud). "Cloudy Agaric."
Denny Wood. Emery Down. Bank. Tantany Wood. New Copse.
In woods and thickets. Frequent. Edible and delicious.

**C. clavipes** (Pers.) Fr. (Lat., club-footed; from the swollen base of the stem).
Church Place Inclosure. Buskett's Wood. Tantany Wood. Ivy Gutter.
In woods, especially pine. Common.

**C. odora** (Bull.) (Lat., scented).
Beaulieu Road. Church Place Inclosure. Holmhill.
In woods. Not common. Edible and delicious. Known by its greenish pileus and scent of violets.

**C. rivulosa** (Pers.) Fr. (Lat., rilled, from the furrowed pileus).
Brockis Hill.
Chiefly in pastures and by roadsides. Uncommon. Dingy flesh-colour.

**C. cerussata** Fr. (Lat., painted with white lead).
Beaulieu Road. Dearleap Plantation.
In woods. Not common. Edible. White, cap long convex, stem thicker downwards.

**C. phyllophila** (Pers.) Fr. (Gr., leaf-loving; from the habitat).
Beaulieu Road. Rhinefield.
In woods. Uncommon. Poisonous. Whitish tan; umbilicate.

**C. candicans** (Pers.) Fr. (Lat., shining white).
Buskett's Lawn. Ramnor. Mark Ash. Ridley Wood. Holmsley.
In woods. Frequent. Known by its cartilaginous stem.

**C. dealbata** (Sow.) Fr. (Lat., whitened).
Queen's Bower. Denny Wood. Burley.
Amongst short grass in woods, pastures and lawns. Not uncommon. Edible. Cap often irregular and wavy, gills adnate.

**C. fumosa** (Pers.) Fr. (Lat., smoky; from the colour).
Ashurst Wood.
In woods. Uncommon.
var. **caespitosa** Cooke. (Lat., tufted).
Church Place Inclosure.
In woods. Uncommon.

**C. pergamena** Cooke. (Lat., parchment-like).
Near Lyndhurst.
In woods. Rare.

**C. opaca** (Witb.) Fr. (Lat., not transparent).
Near Lyndhurst.
In woods. Rare. Like *C. cerussata*, but cap umbonate.

**C. infundibuliformis** (Schaeff.) Fr. (Lat., funnel-shaped).
Rhinefield. Mark Ash. Denny Wood. Brockenhurst Park.
In woods and fields. Common. Edible and delicious. Gills much narrowed at both ends. Pleasant smell. Flesh-colour or tan to whitish.

**C. gilva** (Pers.) Fr. (Lat., pale yellow, but in mycology deep reddish flesh-colour).
Church Place Inclosure. New Copse.
In woods. Uncommon. Edible. Firm; all ochraceous inside and out.

**C. geotropa** (Bull.) Fr. (Gr., turned towards earth; from the margin).
Near Rushpole Wood.
In woods and pastures. Uncommon. Edible and delicious.

**C. inversa** (Scop.) Fr. (Lat., inverted; from the margin).
Beaulieu Road. Rhinefield.
In woods and under gorse. Not uncommon. Cap dull brownish orange, flesh similar.

**C. flaccida** (Sow.) Fr. (including var. **lobata** Sow.) (Lat., flabby).
Brockis Hill. Hollands Wood. Mark Ash. Burley.
In woods. Not uncommon. Cap rust-coloured, flesh pallid.

**C. catina** Fr. (Lat., a deep bowl or pot; from the shape).
Near Lyndhurst.
In pine woods, etc. Rare. Smells like *C. infundibuliformis*, but white from the first.

**C. tuba** Fr. (Lat., a trumpet, form the shape).
Near Lyndhurst. Ironshill.
Among leaves, etc. Rare. Entirely white. Gills deeply decurrent, very crowded.

**C. cyathiformis** (Bull.) Fr. (Lat., shaped like a drinking-cup).
Buskett's Lawn. Bolderwood. New Copse.
In woods, pastures, etc. Not common. Edible. Dark coloured. Late.

**C. brumalis** Fr. (Lat., of winter; from its appearing late).
Bolderwood. Denny Wood. Holmsley Inclosure. Busketts.
In pine woods, etc. Not uncommon. Edible.

**C. metachroa** Fr. (Gr., changing colour).
Rhinefield. Mark Ash. Costicles. New Copse. Burley. Busketts.
In pine woods, etc. Common. Gills greyish. Odourless. Stem mealy at apex.

**C. ditopoda** Fr. (Gr., double-footed; the stem is sometimes central and sometimes excentric).
Brockis Hill. Rhinefield. Burley. Busketts.
In pine woods. Frequent. Mealy smell.

**C. fragrans** (Sow.) Fr. (Lat., sweet-scented).
Buskett's Lawn. Bolderwood. Bratley Wood. Denny. New Copse. Ivy Gutter.
In woods and pastures. Common. Edible.

**C. obsoleta** (Batsch) Fr. (Lat., worn out; from its weak odour).
Ironshill.
Among grass and leaves. Uncommon. Intermediate between *C. fragrans* and *C. metrachroa*.

Genus 7. **LACCARIA** (Berk.) (From shellac, characterising some of the species). Sometimes included in *Clitocybe*.

**L. laccata** (Scop.) B. and Br. (including var. **amethystina** (Vaill.) B. and Br.) (Lat., lacquered).
Dearleap. New Copse. Burley. Ridley Wood. Mark Ash. Busketts. Holmhill. Ashurst, etc., etc.
In woods, heaths, etc. Very common. Edible but tough.

Genus 8. **COLLYBIA** Fr. (Gr., *kollubos*, a small coin, from the shape of the frequently flattish pileus). Margin of pileus at first incurved. Gills attached, stem cartilaginous.

**C. radicata** (Relh.) Fr. (Lat., having a root).
Denny Lodge Inclosure. Buskett's Lawn. Mark Ash. Burley. Ridley Wood. Bramshaw, etc.
In woods. Common. Edible. Cap glutinous, wrinkled; long rooting stem.

**C. platyphylla** Fr. (Gr., broad-leaved; from the gills).
Buskett's Wood. Ober Valley. Ashurst. Denny Lodge Inclosure. Church Place Inclosure.
In woods, on rotten wood or stumps. Frequent.

**C. fusipes** (Bull.) Fr. (Lat., spindle-footed; from the shape of the stem).
Holland Wood. Holmsley. Denny. Brockenhurst Park.
In woods and under oaks in fields. Common. Edible and palatable.

**C. maculata** (A. and S.) Fr. (Lat., spotted; from the foxy stains).
Setley. Pig Bush. Dearleap. Ivy Gutter. Pignal. Denny. Holidayshill. Rhinefield, etc.
In woods, chiefly pine. Very common. Edible but bitter.

**C. prolixa** (Fl. Dan.) Fr.
Rhinefield.
Among dead leaves. Rare.

**C. butyracea** (Bull.) Fr. (Lat., buttery; from the greasy appearance).
Buskett's Wood. Dearleap. Ivy Gutter. New Copse. Hollands Wood. Burley. Ridley Wood. Holmhill, etc.
In woods. Very common. Base of stem inflated and flabby.

**C. velutipes** (Curt.) Fr. (Lat., velvet-footed; from the stem).
Ashurst. Denny. Ironshill. Emery Down. Rhinefield. Bramshaw, etc.
On trunks and stumps, especially gorse. Edible. Winter.

**C. hariolorum** (DC.) Fr. (Lat., of soothsayers).
Denny Lodge Inclosure.
In woods, among beech leaves. Rare. Solitary; base of stem woolly.

**C. conigena** (Pers.) Fr. (Lat., growing on fir-cones).
Buskett's Wood. Holmsley. Dearleap. New Copse. Hollands Wood. Holmhill. Mark Ash, etc.
On old buried cones. Common. Gills very narrow, crowded, pallid; stem downy.

**C. cirrhata** (Schum.) Fr. (Lat., curled; from the thin twisted stem).
Bolderwood. Denny.
Among moss and on the bare ground. Not common.

**C. nitellina** Fr. (Lat., like a dormouse; from the colour).
Near Lyndhurst.
On heaths, etc. Uncommon.

**C. tenacella** (Pers.) Fr. (Lat., somewhat persistent).
Bolderwood. Holmsley Inclosure. Woodhurst.
In woods, especially pine. Not common. Gills broad, snow-white; stem naked.

**C. dryophila** (Bull.) Fr. (Gr., oak-loving).
Holmsley. Brockenhurst Park. Ivy Gutter. Hollands Wood. Burley. Ridley Wood. Holmhill. Ashurst, etc.
In woods and pastures under oaks. Very common. "Suspected" (Cooke), "Edible" (Rea). Gills narrow and crowded; stem reddish-yellow.

**C. ocellata** Fr. (Lat., with a little eye; perhaps from the dark disc).
Near Lyndhurst.
Among grass in pine woods. Rare.

**C. rancida** Fr. (Lat., rank; from its odour of musty flour).
Ramnor.
In woods. Uncommon. Rooting.

**C. inolens** Fr. (Lat., without smell).
Buskett's Lawn. Brockis Hill. Costicles.
In pine woods, etc. Not common. Resembles *Entoloma sericeum*.

**C. ambusta** Fr. (Lat., burnt, from the habitat).
Near Lyndhurst.
On burnt ground. Not common. Umbonate.

Genus 9. **MYCENA** Fr. (Gr., *mukes*, a fungus). Pileus thin, bell-shaped, usually striate; stem cartilaginous. Small.

**M. pelianthina** Fr. (Gr., livid; from the colour).
Near Lyndhurst.
In woods, especially beech. Uncommon. Gills spotted and edged purple.

**M. Iris** (Berk.) (Gr., the rainbow; from the colouration).
Woodlands Inclosure.
On fir stump. Uncommon. Plum-coloured; downy.

**M. aurantio-marginata** Fr. (Lat., orange coloured margin; referring to the gills).
Allum Green.
Among short grass. Not common.

**M. rubro-marginata** Fr. (Lat., red-margined [gills]).
Roadside near Lyndhurst Road Station.
On rotten wood, pine stumps, twigs, etc. Uncommon.

**M. olivaceo-marginata** Fr. (Lat., margin olivaceous).
Brockenhurst Park.
Among short grass. Not noticed as common. All honey colour; edge of gills brownish-olive when moist.

**M. pura** (Pers.) Fr. (Lat., pure; from the clear rose or lilac colour).
Costicles. Ivy Gutter. New Copse. Hollands Wood. Ridley Wood. Denny. Holmhill. Mark Ash, etc.
In woods. Common. Taste and smell of radishes.

**M. luteo-alba** (Bolt.) Fr. (Lat., yellowish white; *luteus*, pale yellow).
Bank. Ridley Wood. Lyndhurst.
In pine woods, among moss, etc. Not common. Differs from *M. flavo-alba* in the pale yellow stem.

**M. flavo-alba** Fr. (Lat., yellowish white; *flavus*, rich yellow).
Denny Lodge Inclosure.
Among moss, short grass, etc. Not common. Known by the pellucid stem.

**M. lactea** (Pers.) Fr. (Lat., milky; from its milk-white colour).
Costicles. Church Place Inclosure. Ivy Gutter.
On conifer needles. Not common.

**M. rugosa** Fr. (Lat., wrinkled; from the pileus).
Rhinefield. Hollands Wood. Denny. Holmsley. Ridley Wood. Holmhill. Busketts, etc.
On and near trunks and stumps. Very common. Gills grey.

**M. galericulata** Fr. (Lat., small-capped).
Rhinefield. Costicles. Woodhurst. Dearleap. Mark Ash. Denny. New Copse. Holmhill. Holmsley, etc.
On trunks, stumps, and the ground under trees. Very common. Tufted. Gills pinkish.
var. **calopoda** Fr. (Gr., beautiful foot).
Holmhill.
On stump. Uncommon. Stems chestnut-colour, united at base.

**M. polygramma** (Bull.) Fr. (Gr., with many lines; referring to the stem).
Ramnor. Holmhill.
On trunks and stumps. Uncommon.

**M. tintinnabulum** Fr. (Lat., a bell; the shape of the pileus when young).
Ironshill.
On fallen trunks, etc. Uncommon.

**M. alcalina** Fr. (Lat., alkaline; the odour).
Ramnor. Mark Ash. Bank. Ridley Wood. Burley.
On trunks, stumps, etc. Frequent. Stem yellowish, viscid.

**M. puliata** Berk. and Cke. (Lat., clothed in black; from the dark colour).
Church Place Inclosure. Brockis Hill. Lyndhurst.
Among grass. Uncommon. Resembles *M. leucogala*, but without milk.

**M. ammoniaca** Fr. (Lat., ammoniacal; from the odour).
Bolderwood. Costicles. Holmsley. Dearleap. Ivy Gutter. New Copse. Holmhill. Busketts, etc., etc.
On the ground, usually under conifers, often in great numbers. Stem dry.

**M. metata** Fr. (Lat., measured out; probably meaning conical).
Ramnor. Bank.
Among moss in pine woods, etc. Not uncommon. Soft, soon turning pale.

**M. peltata** Fr. (Lat., shield-bearing. Cap soon flat).
Near Lyndhurst.
Among grass. Uncommon.

**M. stannea** Fr. (Lat., of tin ; referring to the colour).
Holmsley. Woodfidley. Ironshill.
Among grass in woods. Not common.

**M. filopes** (Bull.) Fr. (Lat., thread-stemmed).
Costicles. Minstead. Ramnor. Rhinefield. Woodhurst. New Copse. Brook. Holmhill. Highland Inclosure, etc.
In woods among leaves, etc. Common.

**M. amicta** Fr. (Lat., clad ; from the powdery down).
Buskett's Lawn.
Among moss. Uncommon.

**M. debilis** Fr. (Lat., frail).
New Copse.
Under trees. Uncommon.

**M. haematopoda** (Pers.) Fr. (Gr., bloody foot or stem, which exudes a red fluid when broken).
Near Lyndhurst Road Station.
On decaying birch. Uncommon.

**M. sanguinolenta** (A. and S.) Fr. (Lat., full of blood ; from the red juice).
Ashurst. Bank. Costicles. Setley. New Copse. Mark Ash. Holmhill. Hollands Wood, etc.
In woods. Common.

**M. galopoda** (Pers.) Fr. (Gr., milk-stemmed ; from the white juice).
Queen's Bower. Holmsley. Knightwood. Mark Ash. Wood Crates. Highland Inclosure. Holmhill, ete.
In woods. Common. Varies in depth of colour. Gills white.

**M. leucogala** Cooke. (Gr., white milk ; from the juice).
Bolderwood. Queen's Bower. Mark Ash. Burley. Ridley Wood.
On stumps and the ground in woods. Not uncommon. Cap dark coloured, gills grey.

**M. epipterygia** (Scop.) Fr. (Gr., upon bracken).
Holmsley. Gritnam. New Copse. Bank. Ivy Gutter. Bramshaw. Ashurst. Holmhill. Hollands Wood, etc.
In woods and among grass. Common. Known by its yellow stem and separable skin.

**M. clavicularis** Fr. (Lat., tendril-like ?)
Costicles.
In woods. Uncommon. Like *M. epipterygia*, but no separable skin.

**M. vulgaris** (Pers.) Fr. (Lat., common).
Ramnor. Beaulieu Heath.
Under pines in woods and on lawns. Abundant locally. Cap depressed, viscid, as well as stem.

**M. rorida** Fr. (Lat., dewy, from the stem almost dripping with gluten).
Bank.
On dead twigs in woods. Not common.

**M. tenerrima** Berk. (Lat., very tender).
Millypond Bridge. Ivy Gutter.
On fir-cones, sticks, etc. Uncommon. Small, white ; stem hairy, fixed by a minute disc.

**M. corticola** (Schum.) Fr. (Lat., a dweller on bark).
Ashurst. Tantany Wood.
On bark of trees. Uncommon.

**M. hiemalis** (Osb.) Fr. (Lat., belonging to winter ; it is a late kind).
Near Lyndhurst.
On bark of elms, etc. Uncommon.

**M. capillaris** (Schum.) Fr. (Lat., hair-like ; from the stem).
Near Lyndhurst. Buskett's Wood.
On beech leaves. Not common.

Genus 10. **OMPHALIA** Fr. (Gr., *omphale*, the navel, from the usual shape of the pileus). Gills decurrent; stem cartilaginous, smooth, polished; pileus usually depressed in centre.

**O. rustica** Fr. (Lat., of the country).
Denny Wood.
On bare ground. Uncommon. Somewhat resembling *O. umbellifera*, but gills narrowed behind.

**O. umbellifera** (Linn.) Fr. (Lat., umbrella-like).
Ramnor. Picket. Denny Wood. Holidayshill.
In swamps, etc. Not uncommon. Gills broad, almost triangular, very distant. Very variable in colour.

**O. pseudo-androsacea** (Bull.) Fr. (Lat., from its habit of mimicking *Marasmius androsaceus*).
Near Lyndhurst.
Among short grass. Uncommon.

**O. grisea** Fr. (Lat., grey).
Brockis Hill. Buskett's Wood.
Among short grass. Not uncommon.

**O. fibula** (Bull.) Fr. (Lat., a pin; from the appearance).
Buskett's Wood. Brockis Hill. Matley Heath. Rhinefield, Bank.
Among short grass. Fairly common. Usually orange.

var. **Swartzii** Karst.
Costicles.
Among short grass. Not common. Top of stem violet.

Genus 11. **PLEUROTUS** Fr. (Gr., *pleuros*, a side, *ous*, an ear, from shape of pileus and position of stem). Stem excentric, lateral, or absent.

**P. lignatilis** Fr. (Lat., belonging to wood).
Queen's Bower. Denny Wood.
On trunks, rotten wood, etc. Not common. Dingy white; gills much crowded, stem ringed.

**P. ostreatus** (Jacq.) Fr. (including var. **columbinus** Quél.) "Tree Oyster."
Near Lyndhurst. Rhinefield. Denny Lodge Inclosure. Mark Ash.
On trunks. Not uncommon. Cap brownish, bluish, etc., gills decurrent, anastomising behind, stem lateral, no ring.

**P. acerinus** Fr. (Lat., of the maple).
Denny Lodge Inclosure.
On felled and stacked wood. Uncommon.

**P. mitis** (Pers.) Fr. (Lat., mild).
Denny wood.
On fallen branches of pine. Uncommon. Resembles *Panus stypticus*.

**P. septicus** Fr. (Gr., putrefying; from its habitat).
Buskett's Wood.
On rotten wood, etc. Not common. Snow-white; downy. Like *Clandopus variabilis*, but gills always white.

**P. applicatus** (Batsch) Fr. Lat., lying close).
Brockenhurst Park.
On fallen branch of oak. Uncommon. Small, dingy grey.

**P. chioneus** Pers. (Gr., snowy; from its colour).
Buskett's Wood.
On fallen branches and leaves. Not common. Like *P. septicus*, but smaller.

Genus 12. **HYGROPHORUS** Fr. (Gr., *hugros*, moist, *phero*, I bear, from the moist appearance of most of the species). Gills waxy; plant often brightly coloured.

**H. eburneus** (Bull.) Fr. (Lat., of ivory; ivory-white).
Bank. Ironshill.
In woods. Not common. Edible.

**H. cossus** (Sow.) Fr. (Lat., from its smelling like the caterpillar of the goat-moth, *Cossus*).
Brockis Hill. Emery Down.
In woods. Not common.

**H. discoideus** (Pers.) Fr. (Lat., disc-like).
Near Lyndhurst. Bank. Holmhill.
In woods. Not common. Yellowish-red, disc darker.

**H. limacinus** (Scop.) Fr. (Lat., slimy like a slug).
Near Lyndhurst.
In woods. Uncommon.

**H. hypothejus** Fr. (Gr., sulphur under, because yellow beneath the olive gluten).
Costicles. Rhinefield. New Copse. Mark Ash. Burley. Emery Down. Dearleap, etc.
In woods and open places under conifers. Common. **Edible.**

**H. mesotephrus** Berk. (Gr., ash-coloured in centre).
Buskett's Lawn.
Under trees. Uncommon.

**H. livido-albus** Fr. (Lat., leaden [pileus] white [gills]).
Denny.
In woods. Uncommon.

**H. pratensis** (Pers.) Fr. (Lat., of meadows).
Denny. Buskett's Lawn. Emery Down. Ocknell. Balmer Lawn. Allum Green, etc.
In pastures, woods and heaths. Very common. **Edible.**

**H. virgineus** (Wulf.) Fr. (Lat., virgin; from its whiteness).
Buskett's Lawn. Brockenhurst Park. Ocknell. Wilverley. Denny. Balmer Lawn. Burley. Allum Green. Ridley, etc.
In pastures, woods, and on lawns. Very common. **Edible.**
var. **roseipes** Mass. (Lat., with the stem rose-coloured).
Holmhill.
Under conifers. Uncommon.

**H. niveus** (Scop.) Fr. (Lat., snow-white).
Holmsley. Obere. Brockenhurst Park. Bank. Emery Down. Race-course, etc.
On lawns, in pastures, and woods. Very common. **Edible and** delicious. Much smaller than *H. virgineus*, and differs in the **hollow** stem and umbilicate pileus.

**H. russo-coriaceus** B. and Br. (Lat., of russia-leather; from the odour.)
Ironshill.
On heaths, etc. Uncommon.

**H. laetus** (Pers.) Fr. (Lat., cheerful; from its colour).
Rhinefield. Ironshill. Buskett's Lawn. Holmsley.
On pastures and grassy places in woods. Frequent.

**H. ceraceus** (Wulf.) Fr. (Lat., waxy).
Holmsley Inclosure. Denny. Emery Down. Bank.
In pastures. Frequent. Edible and delicious. Yellow, gills broadly attached.

**H. coccineus** (Schaeff.) Fr. (Lat., scarlet).
Holmsley. Emery Down. Brockenhurst Park. Denny. Balmer Lawn. Burley, etc.
In pastures and woods. Common. Edible and delicious. **Base of** stem yellow. Trama red like cap.

**H. miniatus** Fr. (Lat., red).
Wootton. Ashurst. Ramnor. Holmsley. Ridley. Ocknell, etc.
In pastures, woods and boggy places. Common. **Edible and** delicious. Much smaller than *coccineus* or *puniceus*, trama **yellow,** stem crimson.

**H. turundus** Fr. (Lat., lint, from the linty scales which at length cover it).
Burley New Inclosure. Holmsley.
In moist places in the open and in woods. Not common. **Allied to** *H. miniatus*, but gills decurrent, stem tawny.

**H. puniceus** Fr. (Lat., purplish).
Rhinefield. Ramnor. Denny. Emery Down. Burley. Balmer Lawn. Allum Green, etc.
In pastures and woods. Very common. Edible. Base of stem white.

**H. obrusseus** Fr. (Lat., of gold-assaying; from the colour).
Near Lyndhurst. Ironshill.
In grassy places in woods, etc. Not common. Resembles *H. puniceus*, but yellow.

**H. conicus** (Scop.) Fr. (Lat., conical).
Denny. Emery Down. Balmer Lawn. Bank. Ridley. Racecourse. Gritnam, etc.
In pastures and woods. Very common. Poisonous. Turns black.

**H. calyptraeformis** Berk. (Lat., hood-shaped).
Near Lyndhurst. Denny Heath.
In open places in woods and on commons. Uncommon.

**H. chlorophanus** Fr. (Gr., appearing greenish yellow).
Buskett's Lawn, Rhinefield. Denny Wood. Mark Ash. Holmsley, Brockenhurst Park. Emery Down, etc.
In pastures and woods. Common. Edible and delicious. Clear yellow. Gills adnexed, ventricose.

**H. psittacinus** (Schaeff.) Fr. (Lat., parrot-coloured; red and green).
Buskett's Lawn. Emery Down. Ridley. Mark Ash. Allum Green. Brockenhurst Park, etc.
In pastures, on lawns and commons. Very common. Edible and delicious.

**H. unguinosus** (Pers.) Fr. (Lat., oily; from the surface).
Denny.
In grassy places in woods. Uncommon. Smoky-brown. Very glutinous.

**H. nitratus** (Pers.) Fr. (Lat., nitrous-smelling).
Ironshill. Among grass. Uncommon.

Genus 13. **LACTARIUS.** (Lat., *lac*, milk from the milky juice exuded when broken.) Gills usually decurrent; plant often large, fleshy.

**L. torminosus** (Schaeff.) Fr. (Lat., causing colic).
Ramnor. Knightwood. Denny. Ocknell. Dearleap.
In woods. Rather common. Strawberry colour; margin involute, cottony.

**L. turpis** (Weinm.) Fr. (Lat., base, ugly; from the dingy colour).
Ramnor. Ashurst Wood. Rhinefield. Burley New Inclosure. Dearleap.
In woods and among grass, chiefly under birches. Frequent. "Poisonous" (Cooke). "Edible" (Rea).

**L. pubescens** Fr. (Lat., downy; from the margin).
Ramnor. Queen's Bower.
In woods and among grass, chiefly under birches. Not uncommon. Resembles *L. torminosus*, but pale, and margin only downy.

**L. insulsus** Fr. (Lat., tasteless, perhaps from its outward resemblance to *L. deliciosus*).
Near Lyndhurst.
In woods and pastures. Not common.

**L. blennius** Fr., (Gr., slimy).
Buskett's Lawn. Bank. Denny. Dearleap. Mark Ash. Holmsley.
In woods. Common. Greenish-grey; stem viscid.

**L. hysginus** Fr. (Gr., a crimson dye, from the reddish flesh-coloured cap).
Ramnor.
In woods. Rare.

**L. uvidus** Fr. (Lat., grape-coloured; from the milk turning lilac).
Near Lyndhurst. Denny.
In woods. Not common. Poisonous.

**L. pyrogalus** (Bull.) Fr. (Gr., fiery milk; it is very acrid).
Near Lyndhurst. Denny. Ivy Wood. Mark Ash. Ridley Wood.
In woods and among grass. Not uncommon. Poisonous. Livid grey; gills ochraceous; stem striate.

**L. chrysorrheus** Fr. (Gr., gold-flowing; from the yellow milk).
Denny. Hollands Wood. Rhinefield. Ironshill. Ramnor. Holmsley. Woodhurst. New Copse, etc.
In woods, chiefly under oaks. Common.

**L. piperatus** Fr. (Lat., peppery).
Near Lyndhurst.
In woods. Uncommon. "Poisonous" (Cooke). "Edible" (Rea.) White. Gills very narrow and crowded. Milk abundant.

**L. vellereus** Fr. (Lat., fleecy; from the pileus).
Buskett's Lawn. Dearleap. Tantany Wood. Hollands Wood. New Copse. Mark Ash. Holmhill. Ridley Wood, etc.
In woods. Very common. Milk scanty. Gills broader and more distant than in *L. piperatus*.

**L. deliciosus** (Linn.) Fr. (Lat., delicious). "Orange Milk Agaric."
Holmsley. Ashurst. Ironshill. Dearleap. New Copse. Pignal. Holmhill. Rhinefield, etc.
In woods and grassy places near pines. Common. Edible.

**L. pallidus** (Pers.) Fr. (Lat., pale).
Bank. Near Cadnam. Denny. Burley New Inclosure. Mark Ash.
In woods, chiefly under beeches. Frequent. Pale tan, zoneless.

**L. quietus** Fr. (Lat., at rest, mild; from the bland taste).
Dearleap. New Copse. Hollands Wood. Mark Ash. Burley. Busketts. Holmhill. Minstead, etc.
In woods and open ground under trees. Very common.

**L. theiogalus** (Bull.) Fr. (Gr., sulphur-coloured, which the milk turns from white).
Woodlands Inclosure. Denny.
In woods. Not common. Tawny-rufous.

**L. vietus** Fr. (Lat., shrivelled).
Near Burley.
In woods. Uncommon. Milk turns grey.

**L. cyathula** Fr. (Lat., a little cup).
Bolderwood.
Under birches, etc. Uncommon.

**L. rufus** (Scop.) Fr. (Lat., red).
Tantany Wood. Setley. Perry Wood. Rhinefield. Ironshill. Obere. Denny. Holmsley, etc.
In woods, especially of Scots pine. Very common. Poisonous. Very acrid. Cap rufous-bay. Sharply umbonate.

**L. glyciosmus** Fr. (Gr., sweet-scented).
Queen's Bower. Beaulieu Road. Denny. Mark Ash. Ridley Wood. Holmsley.
In woods, especially pine. Common. Edible.

**L. fuliginosus** Fr. (Lat., sooty; from the dark down with which the cap is sprinkled).
Near Lyndhurst. Beaulieu Road. Denny. Gritnam. Mark Ash. Holmhill.
In woods. Frequent. Poisonous. Flesh turns pink, then saffron, when broken.

**L. serifluus** (DC.) Fr. (Lat., flowing with serum; from its watery milk).
Holmsley. Setley. Dearleap. Ivy Gutter. New Copse. Mark Ash. Busketts. Holmhill. Ridley Wood, etc.
In damp woods and open places. Very common. Resembles *L. subdulcis*, but smaller and more slender; stem solid.

**L. mitissimus** Fr. (Lat., most mild).
Near Lyndhurst. Buskett's Lawn. Denny. Church Place Inclosure. Holmsley. Holmhill.
In woods. Frequent. Edible. Bright golden tawny. Papillate.

**L. subdulcis** (Bull.) Fr. (Lat., almost sweet).
Hollands Wood. Ridley Wood. Mark Ash. Holmsley. Allum Green.
In woods and pastures. Frequent. Edible. Cap rufous-cinnamon or bay, not becoming paler; smooth, zoneless. Stem becoming hollow.

**L. cimicarius** (Batsch) Phil. (Lat., belonging to bugs, from its odour).
Bolderwood.
In woods, etc. Uncommon. Dark bay-brown.

Genus 14. **RUSSULA** Fr. (Lat., *russus*, red, the colour of many of the species)
Gills brittle, usually adnate; plants mostly large, fleshy, showy. Taste mild (M.) or acrid (A).

**R. nigricans** (Bull.) Fr. (Lat., becoming black).
Buskett's Wood. Denny. Holmsley. Hollands Wood. Woodhurst. Vinney Ridge. Dearleap. New Copse. Mark Ash. Burley, etc.
In woods. Common. Gills very distant, brittle; flesh turns reddish.

**R. adusta** (Pers.) Fr. (Lat., scorched; from its colour).
Holmsley. Denny. Minstead. Gritnam. Ridley Wood. Holidays-hill. M.
In woods. Not uncommon. Gills crowded. Flesh changeless.

**R. densifolia** Secr. (Lat., gills close-set).
Denny Lodge Inclosure. Rhinefield. Ironshill.
In woods. Not uncommon. Gills thin, crowded. Flesh turns red. M.

**R. delica** Fr. (Lat., weaned, because it is like *Lactarius vellereus*, but is without milk).
Near Lyndhurst. Tantany Wood.
In woods. Uncommon. Often tinged greenish. M.

**R. olivascens** Fr. (Lat., somewhat olive-coloured).
Denny Lodge Inclosure. Holmhill.
In woods. Uncommon. M.

**R. furcata** (Pers.) Fr. (Lat., forked; the gills near the stem are so).
Buskett's Wood. Hollands Wood. Ashurst. Mark Ash. Bolderwood. Ridley Wood, etc.
In woods. Common. Poisonous. Gills broad, narrowed at each end.

**R. sanguinea** (Bull.) Fr. (Lat., blood-coloured).
Denny Lodge Inclosure.
In woods. Uncommon. Poisonous. Gills decurrent. A.

**R. sardonia** Fr. (Lat., a bitter plant).
Near Lyndhurst.
Under trees. Uncommon. A.

**R. depallens** (Pers.) Fr. (Lat. becoming pale).
Costicles. Hollands Wood. Bank Church Place Inclosure. Holmsley. Woodhurst. New Copse. Holmhill.
In woods. Frequent. Edible. Stem dilated at top, white, turning grey. M.

**R. coerulea** (Pers.) Fr. (Lat., azure; the cap is purple, inclined to blue at margin).
Denny. Ashurst. Ridley. Rhinefield. Pignal. Buskett's Wood. Holmsley. Dearleap. Hollands Wood. New Copse. Ramnor, etc.
Under pines. Common. Edible. Known by the umbo. M.

**R. drimeia** Cke. (Gr., pungent; from the taste).
Denny. Perry Wood. Rhinefield. Bolderwood. Ironshill. Holmsley. Dearleap. Ashurst. New Copse, etc.
Under pines. Common. Gills primrose; stem rosy. A.

**R. lactea** (Pers.) Fr. (Lat., milky; the colour).
Ashurst. Denny.
In woods. Not common. Cap minutely cracked. M.

var. **incarnata** Quél. (Lat., flesh-coloured).
Near Lyndhurst. Ashurst. Ironshill. Dearleap. Mark Ash. Ridley Wood.
In woods. Not uncommon. M.

**R. virescens** (Schaeff.) Fr. (Lat., becoming green).
Near Rushpole Road. Denny. Near Roman Arch. Church Place Inclosure.
In woods. Not uncommon. Edible. Skin minutely cracked. M.

**R. lepida** Fr. (Lat., pretty).
Buskett's Wood. Ironshill.
In woods. Uncommon. Edible and delicious even when raw. Cap blood-red or rosy, fading, minutely cracked. M.

**R. rubra** (DC.) Fr. (Lat., red).
Buskett's Lawn. Church Place Inclosure.
In woods. Uncommon. Firm, hard. A.

**R. xerampelina** (Schaeff.) Fr. (Gr., of the colour of withered vine-leaves).
Near Lyndhurst. Ashurst. Denny Wood.
In woods. Not uncommon. M.

**R. vesca** Fr. (Lat., eatable).
Church Place Inclosure. Busketts. Denny. Ridley Wood. Holmsley. Woodhurst. Hollands Wood. Mark Ash, etc.
In woods. Common. Edible and delicious. Cap finely wrinkled. Flesh foxes. Smells of crab. M.

**R. cyanoxantha** (Schaeff.) Fr. (Lat., blue and yellow).
Near Lyndhurst. Beaulieu Road. Mark Ash. Holmsley. Denny.
In woods, etc. Frequent. Edible and delicious. Tastes like nut when raw. Hardly expands. M.

**R. heterophylla** Fr. (Gr., gills different—in length).
Rhinefield. Denny. Church Place Inclosure.
In woods. Uncommon. Edible. Known by the extremely narrow gills. M.

**R. consobrina** Fr. (Lat., cousin—to neighbouring species).
var. **sororia** (Larbr.) Fr. (Lat., sister).
Bolderwood. Church Place Inclosure. Dearleap.
In woods and under conifers. Not uncommon. Umber or olive-brown. Margin striate. A.

var. **intermedia** Cooke. (Lat., intermediate).
Near Lyndhurst.
In woods. Uncommon.

**R. foetens** (Pers.) Fr. (Lat., stinking).
Ashurst. Whitley Wood. Buskett's Wood. Denny. Mark Ash. New Copse. Brockis Hill. Gritnam.
In woods, etc. Common. Reputed poisonous. Cap dingy ochraceous, grooved and tubercled. A.

**R. fellea** Fr. (Lat., full of gall, bitter).
Near Lyndhurst. Ridley Wood. Buskett's Wood. Mark Ash. Church Place Inclosure. Denny. Dearleap. Holmsley.
In woods, chiefly beech. Common. Poisonous. All straw coloured. A.

**R. Queletii** Fr. (In honour of Mons. L. Quélet).
Costicles.
In woods. Uncommon. A.

var. **purpurea** Gillet.
Near Lyndhurst.
In woods. Uncommon. A.

**R. emetica** Fr. (Lat., making sick).
Bank. Dearleap. Bolderwood. New Copse. Ironshill. Emery Down. Denny.
In woods, chiefly beech. Frequent. Poisonous. Cap deep rose or blood-red, bleaching, edge grooved and tubercled. Gills pure white. A.

**R. azurea** Bres. (Low Lat., faint blue).
Church Place Inclosure. Dearleap.
In woods. Rare. Edible. Rather glaucous. Covered with a fine white bloom. M.

**R. ochroleuca** (Pers.) Fr. (Including **R. granulosa** Cke.)
Buskett's Wood. Bank. Holmsley. Ridley Wood. Setley. Dearleap. Hollands Wood. New Copse. Mark Ash, etc.
In woods. Common. Cap yellow. Gills white. Stem white, then grey. A.

**R. citrina** Gillet. (Lat., citron-coloured).
Denny Lodge Inclosure.
In woods. Uncommon. Cap lemon-yellow. Gills and stem white. M.

**R. fragilis** Fr. (Lat., easily broken).
Holmsley. Ashurst. Ironshill. Denny. New Copse. Mark Ash. Rhinefield. Brockis Hill. Gritnam, etc.
In woods, etc. Very common. Poisonous. Like *R. emetica*, but smaller, more fragile, gills more crowded, flesh of cap not red under cuticle. A.

var. **nivea** Cke. (Lat., snowy).
Bank. New Copse.
In woods. Uncommon. A.

var. **violacea** Quél. (Lat., violet).
Beaulieu Road. Bolderwood. Holmsley. Ironshill. Dearleap. New Copse.
In woods. Common. A.

var. **fallax** Cke. (Lat., deceptive ; from its contradictory affinities).
Pig Bush. New Copse.
Under trees. Uncommon. Dingy red or purplish. Disc very dark-coloured. A.

**R. veternosa** Fr. (Lat., languid ; from its doubtful affinities).
Buskett's Wood.
In woods. Uncommon. Cap rosy, gills pale yellow, stem white. A.

**R. integra** (Linn.) Fr. (Lat., whole : perfect in form).
Costicles.
In woods. Not common. Gills very broad, pale yellow, powdered darker. M.

**R. puellaris** Fr. (Lat., girlish ; from its slender form).
Costicles. Queen's Bower. Denny Lodge Inclosure. Ivy Gutter. New Copse.
In woods. Not uncommon. It much resembles *R. fragilis* var. *violacea*, but the taste is mild and the stem foxes when touched. M.

**R. alutacea** (Pers.) Fr. (Lat., like tanned leather).
Near the Roman Arch.
In woods. Uncommon. Edible. Like *R. integra* but gills ochraceous, not powdered. A.

**R. armeniaca** Cke. (Lat., apricot-coloured [pileus]).
Denny Lodge Inclosure. New Copse.
In woods. Uncommon. Gills brilliant deep ochre. M.

**R. lutea** (Huds.) Fr. (Lat., golden-yellow).
Queen's Bower. Brockis Hill. Denny Lodge Inclosure. Ashurst. Holmhill.
In woods. Not uncommon. Edible. Like *R ochroleuca*, but gills yellowish. M.

Genus 15. **CANTHARELLUS** Adans. (Gr., *kantharos*, a sort of drinking-cup, which some species resemble). Gills decurrent, narrow, forking, margin thick.

**C. cibarius** Fr. (Lat., suitable for food). "Chanterelle."
Costicles. Holmsley. Mark Ash. Ridley Wood. Woodfidley. Pignal. Whitley Wood.
In woods. Common. Edible and delicious. Uniform egg-yellow. Gills thick.

**C. aurantiacus** (Wulf.) Fr. (Lat., orange-coloured). "False Chanterelle."
Rhinefield. Tantany Wood. Holmsley. Setley. Dearleap. New Copse. Pignal. Denny, etc.
In woods under conifers, etc. Very common. Gills thin, usually brilliant orange-red. Reputed poisonous.
var. **lacteus** Quél. (Lat., milk-white).
Buskett's Lawn.
Under trees. Rare.
var. **pallidus.**
Pig Bush. Tantany Wood. Dearleap. Whitemoor.
In woods and among gorse. Not uncommon. Cap and gills pale amber, disc and stem darker.

**C. albidus** Fr. (Lat., whitish).
Hincheslea.
Near trees. Rare.

**C. tubaeformis** (Bull.) Fr. (Lat., trumpet-shaped).
Rhinefield. Brockis Hill. Costicles. Mark Ash.
In woods. Not uncommon. Stem lacunose. Cap waved and lobed, not opening into stem.

**C. lutescens** Fr. (Lat., becoming yellow, yellowish).
Near Lyndhurst Road Station.
In woods. Rare.

**C. infundibuliformis** (Scop.) Fr. (Lat., funnel-shaped).
Busketts. Ridley Wood. Holmsley. Woodfidley.
In woods. Not uncommon. Cap usually perforated at base and opening into the hollow stem.

**C. cinereus** (Pers.) Fr. (Lat., ash-coloured).
Denny Lodge Inclosure. Mark Ash.
In woods. Uncommon. Dark. Resembles *Cantharellus cornucopioides*, with which it is often found growing, but has distinct though much reduced gills.

**C. replexus** Fr. var. **devexus** Fr. (Lat., turned back and down).
Buskett's Lawn.
Near trees. Rare.

Genus 16. **NYCTALIS** (Gr., *nux, nuctos*, night, from inhabiting dark places). Parasitic on decaying fungi.

**N. parasitica** (Bull.) Fr.
Costicles. Holmsley. Mark Ash. Ridley Wood.
On dead *Russula adusta, R. fœtens*, etc., in woods. Not uncommon. Grey.

**N. asterophora** Fr. (Gr., bearing stars; from the particles on the cap).
Holmsley Inclosure.
On dead *Russula nigricans*. Not common. Thin, white, tinged fawn-colour.

Division B. *Tenaces.*
Leathery, not putrefying.

Genus 17. **MARASMIUS** Fr. (Gr., *maraino*, I wither or shrivel, which the species do instead of rotting).

**M. peronatus** (Bolt.) Fr. (Lat., booted; from the woolly covering of the lower part of the stem).
Minstead Road. Mark Ash. Church Place Inclosure. Woodfidley. Buskett's Wood. Rhinefield. Woodhurst, etc.
Among leaves under trees. Very common.

**M. oreades** (Bolt.) Fr. (Gr., mountain nymphs; from its forming "fairy rings"). "Fairy-ring Champignon."
Balmer Lawn. Allum Green. Emery Down. Ocknell. Ridley. Buskett's Lawn. Racecourse, etc.
Among grass. Very common. Edible and delicious.

**M. erythropus** (Pers.) Fr. (Gr., red-stemmed).
Buskett's Lawn. Brockis Hill.
In woods. Not uncommon. Edible.

**M. languidus** (Lasch.) Fr. (Lat., weak, limp).
Near Lyndhurst.
On twigs, etc. Rare.

**M. ramealis** (Bull.) Fr. (Lat., of branches; from its habitat).
Ramnor. Denny. Mark Ash. Ridley Wood. Hollands Wood. Holmhill. Burley, etc.
On twigs, leaves, and stems of brambles. Common. White, disc tinged brown. Stem short.

**M. candidus** (Bolt.) Fr. (Lat., shining white).
Church Place Inclosure.
On twigs and leaves. Uncommon. Resembles *M. ramealis*, but wholly white.

**M. rotula** (Scop.) Fr. (Lat., a little wheel; from the collar to which the gills are attached).
Denny Lodge Inclosure. Buskett's Lawn. Ivy wood. Mark Ash. Rhinefield. Ridley Wood, etc.
On fallen twigs in woods and hedgerows. Very common.

**M. androsaceus** (Linn.) Fr. (Gr., like some zoophyte).
Setley. Buskett's Lawn. Holmsley Inclosure. Ridley. New Copse. Mark Ash.
On fallen leaves and twigs in fields and hedgerows. Common. Stem long, bristle-like, blackish, polished.

**M. Hudsoni** (Pers.) Fr. (In honour of Hudson).
Bank.
On fallen holly leaves. Uncommon. Cap covered with purple hairs.

**M. epiphyllus** Fr. (Gr., growing on leaves).
Buskett's Lawn. New Copse. Bank. Ridley Wood. Mark Ash. Church Place Inclosure. Woodhurst, etc.
On dead leaves, etc. Common. Stem horny, minutely velvety.

Genus 18. **LENTINUS** Fr. (Lat., *lentus*, tough or pliant, from the consistency of the species). Gills decurrent, margin toothed.

**L. lepideus** Fr. (Lat., scaly).
Brockenhurst.
On stumps, posts, and railway sleepers. Uncommon.

**L. cochleatus** (Pers.) Fr. (Lat., spiral, like a snail-shell).
Near Lyndhurst.
On stumps in woods. Not common. Edible. Odour of anise.

Genus 19. **PANUS** Fr. (A name given to an arboreal fungus by Pliny).

**P. stypticus** (Bull.) Fr. (Lat., astringent).
Buskett's Lawn. Mark Ash. Denny. Ridley Wood. Ocknell. Queen's Bower. Bank, etc.
On stumps and twigs. Very common. Cinnamon-colour. Stem short, lateral.

Genus 20. **LENZITES** Fr. (After Lenz, a German botanist).

**L. betulina** (Linn.) Fr. (Lat, of the birch; from its habitat).
Rhinefield. Mark Ash. Ridley Wood. Gritnam. Ocknell. Woodfidley. Minstead, etc.
On trunks and stumps. Very common. Fan-shaped, zoned.

**L. flaccida** (Bull.) Fr. (Lat., limp).
Rhinefield.
On trunks and stumps. Uncommon. With narrower attachment and more pliant than *L. betulina*.

Series II. Rhodosporæ.

Spores pink or salmon.

Genus 21. **VOLVARIA** Fr. (Lat., *volva*, a wrapper, from the remains of the universal veil ensheathing the lower part of the stem). Gills free, no ring.

**V. speciosa** Fr. (Lat., beautiful, showy).
Brockenhurst Bridge.
On the ground. Poisonous.

Genus 22. **PLUTEUS** Fr. (Lat., *pluteus*, a pent-house, from the conical pileus). Gills free. No volva or ring.

**P. cervinus** (Schaeff,) Fr. (Lat., deer-like ; from its being tinged with fawn-colour).
Brockis Hill. Mark Ash. Ironshill. Denny Wood. New Copse. Ridley Wood.
On stumps and buried wood. Frequent.

**P. pellitus** (Pers.) Fr. var. **punctillifer** Quél. (Lat., having a skin and puncture-bearing.
Denny Lodge Inclosure.
On felled beech. Rare.

**P. leoninus** (Schaeff.) Fr. (Lat., lion-like ; from its tawny colour).
Mark Ash. Bratley Wood.
On stumps. Uncommon.

**P. chrysophaeus** (Schaeff.) Fr. (Gr., appearing golden).
Ridley Wood.
On fallen sticks. Rare.

Genus 23. **ENTOLOMA** Fr. (Gr., *entos*, within, *loma*, a fringe, probably referring to the innate character of the partial veil). Gills sinuate. Corresponds with *Tricholoma* (white spores), *Hebeloma* (brown spores), and *Hypholoma* (purple spores).

**E. sinuatum** Fr. (Lat., swelled out in curves).
Lyndhurst Road. Woodfidley. Burley New Inclosure. Ironshill. Mark Ash.
In deciduous woods. Frequent. Poisonous. Cap yellowish white, often very large.

**E. lividum** (Bull.) Fr. (Lat., lead-colour).
Near Lyndhurst. Ivy Wood.
In dry woods. Uncommon. Poisonous. Stem shining white.

**E. prunuloides** Fr. (Lat., resembling *Clitopilus prunulus*, which it is said to do in its scent).
Near Lyndhurst. Church Place Inclosure.
Among grass and moss. Uncommon. Resembling *E. lividum*, but much smaller.

**E. Saundersii** Fr. (In honour of W. W. Saunders).
Near Lyndhurst.
On the ground. Rare.

**E. jubatum** Fr. (Lat., maned or crested).
Black Down. Denny Heath. Ramnor.
Among grass. Not uncommon. Mouse-colour, fibrillose. Gills dark, becoming purplish. Stem fibrous, brownish.

**E. sericellum** Fr. = *Leptonia sericella* (Fr.) Quél. (Lat., silky).
Bank. Buskett's Wood. Denny. Vinney Ridge.
Among short grass. Frequent. Small, white.

**E. rhodopolium** Fr. (Lat., rosy-grey).
Near Lyndhurst.
In woods. Uncommon. Cap brown, then pale. Stem long, white, apex mealy.

**E. costatum** Fr. (Lat., ribbed—the gills).
Brockis Hill. Denny.
Among grass. Not common. Somewhat resembling *E. sericeum*.

**E. sericeum** (Bull). Fr. (Lat., silky).
Ramnor. Holmsley. Denny. Ironshill. Emery Down. Ridley. Mark Ash.
Among grass. Common. Resembles *Nolanea pascua*, but smells strongly of new meal, and the gills are broad.

**E. nidorosum** Fr. (Lat., reeking, from its peculiar odour).
Hursthill. Buskett's Wood. Denny. Burley New Inclosure. New Copse.
In woods. Frequent.

Genus 24. **CLITOPILUS** Fr. (Gr., *klitos*, a declivity, *pilos*, a cap, from the decurrent gills). Corresponds with *Clitocybe* (white spores).

**C. prunulus** (Scop.) Fr. (including **orcella** (Bull.) Fr. "Plum Mushroom." "Vegetable Sweetbread."
Buskett's Lawn. New Copse. Near Lyndhurst Road Station. Rhinefield. Holmsley. Burley. Woodfidley. Woodhurst.
In woods, etc. Common. Edible and delicious.

Genus 25. **LEPTONIA** Fr. (Gr., *leptos*, slender, most of the species being small). Pileus umbilicate or darker in centre. Gills not decurrent, soon separating. Margin incurved at first. Stem polished, hollow. Remarkable for shades of blue. Appear in July and August. Corresponds with *Collybia*.

**L. lampropoda** Fr. (Gr., shining foot; from the steel-violet stem).
Buskett's Lawn. Denny.
Among grass. Not common.

**L. lazulina** Fr. (Lat., blue like lapis lazuli).
Balmer Lawn.
Among short grass. Uncommon. Cap blackish-blue. Stem deep blue.

**L. formosa** Fr. (Lat., beautiful).
Near Lyndhurst.
Among short grass. Rare.

Genus 26. **NOLANEA** Fr. (Lat., *nola*, a little bell, from the shape of the pileus in most of the species). Pileus umbonate, margin not incurved usually striate. Stem cartilaginous, hollow. Gills adnexed or free. Corresponds with *Mycena*, *Galera*, *Psathyra* and *Psathyrella*.

**N. pascua** (Pers.) Fr. (Lat., of pastures).
Holmsley. Buskett's Lawn. Denny. Ridley Wood. Mark Ash. Burley. Ramnor, etc.
In woods and pastures. Very common. Gills nearly free. Stem silky fibrous, twisted.

**N. mammosa** (Linn.) Fr. (Lat., with breasts; from the papillate centre of cap).
Brockis Hill. Buskett's Wood.
In woods and pastures. Not common.

**N. rufo-carnea** Berk. (Lat., reddish flesh-coloured).
Buskett's Wood.
In heathy ground, etc. Uncommon.

Genus 27. **ECCILIA** Fr. (Gr., *ekkoilon*, I hollow out, the pileus being often umbilicate). Stem cartilaginous. Gills decurrent. Corresponds with *Omphalia*.

**E. carneo-grisea** B. and Br. (Lat., fleshy-grey).
Denny.
In woods under pines. Uncommon.

Genus 28 **CLAUDOPUS** W. G. Smith. (Lat., *claudus*, lame, Gr. *pous*, a foot, from the crooked or absent stem). Corresponds with *Pleurotus* and *Crepidotus*, differing only in the colour of the spores.

**C. variabilis** (Pers.) W. G. S. (Lat., variable).
Bank. Mark Ash. Woodfidley. Holmsley. Ironshill. Brockis Hill. Holmhill. Minstead, etc.
On decaying leaves, twigs and branches. Common. Small, fixed by the cap. Gills uppermost, white, then pale salmon-colour.

Series III. Ochrosporæ.

Spores various shades of brown.

Genus 29. **PHOLIOTA** Fr. (Gr., *pholis*, a scale, many of the species being scaly). Gills free. Stem with a ring. Corresponds with *Armillaria* and *Stropharia*.

**P. praecox** (Pers.) Fr. (Lat., early ripe; because often appearing in spring).
Near Lyndhurst. Holmsley.
In woods, fields and gardens. Chiefly in spring and probably overlooked. Edible.

**P. radicosa** (Bull.) Fr. (Lat., well-rooted).
Near Lyndhurst. Lyndhurst Road. Palmer's Water.
In woods, generally near a stump. Not uncommon. Strong smelling.

**P. squarrosa** (Müll.) Fr. (Lat., with bristling scales).
Queen's Bower. Mark Ash. Denny Wood. Tantany Wood.
In clusters at the base of trees. Frequent. Edible.

**P. spectabilis** Fr. (Lat., of notable appearance).
Rhinefield. Bank. Matley. Mark Ash. Ironshill. Denny. Dearleap. Holmsley Inclosure.
In clusters at the base of trees, etc. Common. Stem swollen below the middle.

**P. adiposa** Fr. (Lat., fat, greasy, from the glutinous cap).
Lyndhurst. Beaulieu Road. Mark Ash. Denny Lodge Inclosure. Holmhill.
On trunks. Not uncommon.

**P. mutabilis** (Schaeff.) Fr. (Lat., changeable; the dark cap becomes pale).
Denny Lodge Inclosure.
In clusters on stumps. Not common. Edible.

**P. marginata** (Batsch) Fr. (Lat., edged; from the streaks on margin of cap).
Costicles. Near Lyndhurst. Denny Wood.
In woods, chiefly under conifers. Not common. Like *Tubaria furfuracea*, but with a ring.

Genus 30. **INOCYBE** Fr. (Gr., *is*, *inos*, fibre, *kube*, head, from the character of the pileus). Stem ringless. Gills usually sinuate. Allied to *Hebeloma*, but very seldom smooth or viscid.

**I. hystrix** Fr. (Gr., porcupine, from the conspicuous scales).
Woodfidley.
In rides in woods. Uncommon.

**I. lanuginosa** (Bull.) Fr. (Lat., woolly).
Bank.
In woods and shady places. Uncommon.

**I. pyriodora** (Pers.) Fr. (Lat., smelling like pears).
Bank.
In woods. Uncommon. Flesh reddish.

**I. scabra** (Müll.) Fr. (Lat., rough).
Burley. Church Place Inclosure.
In woods. Uncommon.

**I. mutica** Fr. (Lat., curtailed; probably referring to the obtuse cap).
Near Lyndhurst.
In woods, etc. Rare.

**I. carpta** (Scop.) Fr. (Lat., picked, torn).
Lyndhurst.
In woods. Uncommon.

**I. rimosa** (Bull.) Fr. (Lat., cracked; from the cap).
Rhinefield. Wotton. Ironshill. Ivy Wood. Denny Wood. New Copse.
In woods and shady places. Frequent. P. pale. S. whitish.

**I. eutheles** B. and Br. (Gr., well-suckled; from the prominent umbo).
Hollands Wood.
In woods. Not common. Gills broadly adnate.

**I. asterospora** Quél. (Gr., with spores like stars).
Ashurst. Church Place Inclosure. Denny Wood. Busketts.
In woods. Frequent. Resembles *rimosa*, but P. dark, S. reddish.

**I. geophylla** (Sow.) Fr. (Gr., earth-le ved ; probably from the clay-coloured gills).
Bank. Church Place Inclosure. Mark Ash. Ridley Wood.
In woods and shady places. Frequent. Pileus satiny, beautiful blue, sometimes white.

**I. scabella** Fr. (Lat., roughish).
Near Lyndhurst. Matley Wood. Dearleap Plantation. New Copse.
In woods. Not uncommon.

Genus 31. **HEBELOMA** Fr. (Gr., *hebe*, youth, *loma*, fringe, from the nature of the veil). Stem fleshy, fibrous, ringless. Gills sinuate. Pileus smooth, more or less viscid. Spores pale. Corresponds with *Tricholoma*, *Entoloma* and *Hypholoma*.

**H. fastibile** Fr. (Lat., nauseous ; from the smell).
Buskett's Wood. Rhinefield. Mark Ash. Hollands Wood. Holmsley. Tantany Wood. New Copse.
In woods. Common. Viscid, pale, soon flat.

**H. glutinosum** (Lindg.) Fr. (Lat., sticky like glue).
Knightwood.
In woods among dead leaves. Not common. White squamules in the gluten.

**H. testaceum** (Batsch.) Fr. (Lat., brick-coloured).
Buskett's Wood. Denny. Church Place Inclosure. Holmsley Inclosure.
In woods. Not common. Gills crowded. Odour of radishes.

**H. mesophaeum** Fr. (Gr., dusky in the centre).
Buskett's Lawn. Bank. Denny Wood. Holmsley Inclosure. New Copse. Holmhill.
In woods. Frequent.

var. **minor** Cke.
Holmhill.
Under pines. Uncommon.

**H. crustuliniforme** (Bull.) Fr. (Lat., pastry or bun shaped).
Ashurst. Beaulieu Road. Hollands Wood. Ironshill. Balmer Lawn.
In woods and pastures. Frequent. Poisonous. Margin of gills uneven.

var. **minor** Cke.
Beaulieu Road. Rhinefield. Denny Wood. New Copse. Mark Ash.
In woods and pastures. Frequent.

**H. elatum** (Batsch) Fr. (Lat., tall).
Near Cadnam.
In woods, chiefly under conifers. Uncommon.

**H. longicaudum** (Pers.) Fr. (Lat., long-stemmed).
Beaulieu Road.
In woods. Uncommon. Edible.

**H. lugens** (Jungh.) Fr. (Lat., mournful ; from its colour).
Lyndhurst.
In woods. Rare.

Genus 32. **FLAMMULA** Fr. (Lat., *flamma*, a flame, the colour of many of the species). Stem fleshy. Gills usually decurrent, not sinuate. Spores bright. Corresponds more or less with *Clitocybe* and *Clitopilus*.

**F. spumosa** Fr. (Lat., frothy).
Hollands Wood.
On pine wood. Uncommon.

**F. carbonaria** Fr. (Lat., belonging to charcoal ; from its habitat).
Bank.
Where wood has been burnt. Not common.

**F. alnicola** Fr. (Lat., living among alders).
Near Lyndhurst.
On stumps of alder, willow, etc. Uncommon. Resembles *F. conissans*, but stem coloured.

**F. flavida** (Schaeff.) Fr. (Lat., yellowish).
Buskett's Lawn. Rhinefield. Denny.
On trunks, buried wood, etc. Not common.

**F. conissans** Fr. (Lat., shedding dust; from the snuff-like spores).
Knightwood.
On willow trunks. Uncommon. Resembles *F. alnicola*, but stem white.

**F. inopoda** Fr. (Gr., fibrous stem).
Beaulieu Road.
On stumps. Uncommon.

**F. sapinea** Fr. (Lat., belonging to fir-trees).
Mark Ash. Ironshill. Denny. Costicles. Dearleap. Perry Wood Inclosure.
On stumps and fallen branches of conifers. Common. Gills brilliant yellow, then tawny.

Genus 33. **NAUCORIA** Fr. (Lat., *naucum*, a trifle, from the almost obsolete veil). Pileus incurved at first. Stem cartilaginous. Gills not decurrent. Allied to *Galera*, and agrees with *Leptonia* and *Collybia*.

**N. Cucumis** (Pers.) Fr. (Lat., cucumber—smell).
Buskett's Wood.
On the ground among fragments of wood, etc. Rare.

**N. anguinea** Fr. (Lat., snake-like—the stem).
Near Lyndhurst.
On the ground. Rare.

**N. melinoides** (Bull.) Fr. (Gr., honey-like—colour).
Buskett's Lawn. Holmsley. New Copse. Mark Ash. Ridley Wood. Woodfidley, etc.
Among short grass in woods, pastures and lawns. Common. Resembles *Galera hypnorum* but has toothed gills.

**N. badipes** Fr. (Lat., bay-stemmed).
Tantany Wood.
In moist places in woods, etc. Not common.

**N. semiorbicularis** (Bull.) Fr. (Lat., hemispherical).
Racecourse. Ridley Wood. Bank. Minstead.
In open places. Frequent.

Genus 34. **GALERA** Fr. (Lat., *galerus*, skull-cap, the shape of the pileus). Pileus conical or oval, then expanded, striate, margin not at first incurved. Gills not decurrent. Corresponds with *Mycena* and *Nolanea*.

**G. tenera** (Schaeff.) Fr. (Lat., delicate, tender).
Buskett's Lawn. Ashurst. Holmsley. Ivy Gutter. Mark Ash. Ridley Wood.
In pastures and woods. Common.

**G. ovalis** Fr. (Lat., egg-shaped, oval).
Buskett's Lawn. Holmsley Inclosure.
On dung and among grass. Not common. Stem striate.

**G. hypnorum** (Batsch) Fr. (Lat., of mosses).
Holmsley. Setley. New Copse. Hollands Wood. Gritnam. Mark Ash. Rhinefield, etc.
Among moss in woods, etc. Very common.

Genus 35. **TUBARIA** W. G. Smith. (Lat., *tuba*, a trumpet, the shape of some of the species). Stem somewhat cartilaginous. Gills more or less decurrent, triangular. Corresponds with *Ecilia* and *Omphalia*.

**T. furfuracea** (Pers.) W. G. Sm. (With bran or scurf).
Buskett's Wood. Tantany Wood. Mark Ash. Ridley Wood. Brockis Hill. Minstead, etc.
On the ground, twigs and chips, throughout the year. Common.

**T. paludosa** Fr. (Lat., of marshes).
Costicles. Matley. Holmsley. Denny.
Among *Sphagnum* in bogs. Not uncommon. Summer and autumn.

Genus 36. **CREPIDOTUS**. (Lat., *crepida*, a sandal, in allusion to the shape and colour). Stem excentric, lateral or wanting. Allied to *Pleurotus*, but spores rust-colour.

**C. epibryus** Fr. (Gr., on moss).
Whitley Wood, 1903.
On moss. Very rare.

Genus 37. **CORTINARIUS** Fr. (Low Lat., *cortina*, a veil). A well-marked genus, with cobweb-like veil. Gills often purple at first, bright brown at maturity from the rust-coloured spores.

Sub-genus I. *PHLEGMACIUM*. (Gr., *phlegma*, shining moisture, from the clammy pileus). Pileus glutinous. Stem firm, dry, often bulbous.

**C. (Phleg.) triumphans** Fr. (Lat., triumphant, from its splendid appearance).
Denny Lodge Inclosure.
In woods, chiefly under birches. Uncommon.

**C. (Phleg.) varius** (Schaeff.) Fr. (Lat., variable).
Beaulieu Road. Denny.
In woods and pastures. Not common. Edible.

**C. (Phelg.) variicolor** (Pers.) Fr. (Lat., of variable colour).
Brockis Hill.
In woods. Not common.
var. **nemorensis** Fr. (Lat., of groves).
Church Place Inclosure. Dearleap Plantation.
In woods. Not common.

**C. (Phleg.) multiformis** Fr. var. **flavescens** Cke. (Lat., of many shapes, yellowish).
Near Lyndhurst. Denny.
In woods. Not common.

**C. (Phleg.) talus** Fr. (Lat., the ankle; from the stem suddenly spreading like a foot).
Near Lyndhurst.
In woods. Uncommon.

**C. (Phleg.) calochrous** (Pers.) Fr. (Gr., beautifully coloured).
Knightwood.
In woods. Uncommon.

**C. (Phleg.) purpurascens** (Batsch) Fr. (Lat., becoming purple, purplish).
Near Cadnam. Denny. Holmsley. New Copse. Ridley Wood. Knightwood. Holmhill.
In woods. Frequent.

**C. (Phleg.) subpurpurascens** (Batsch) Fr. (Lat., almost *C. purpurascens*).
Ramnor. Denny. Holmhill.
In woods. Not uncommon.

**C. (Phleg.) dibaphus** Fr. var. **xanthophyllus** Cke. (Gr. double-dyed and with yellow gills).
Lyndhurst, near Racecourse.
Under trees. Uncommon.

**C. (Phleg.) orichalceus** (Batsch) Fr. (Gr., like yellow copper-ore).
Lyndhurst Hill, 1884. Ramnor.
In woods. Uncommon.

**C. (Phleg.) emollitus** Fr. (Lat., softened).
Near Lyndhurst Road Station.
In woods. Uncommon.

Sub-genus II. *MYXACIUM* Fr. (Gr., *myxa*, mucus). Cap and stem glutinous.

**C. (Myx.) collinitus** (Pers.) Fr. (Lat., besmeared).
Knightwood. Bank. Church Place Inclosure. Holidayshill.
In woods. Not uncommon. Edible. Stem banded.

**C. (Myx.) mucifluus** Fr. (Lat., flowing with mucus).
Near Lyndhurst. Denny.
In woods. Not common.

**C. (Myx.) elatior** Fr. (Lat., taller).
Holmsley. Dearleap. Burley. New Inclosure. Church Place Inclosure. Hollands Wood. Ivy Gutter. Mark Ash. Ridley Wood. Holmhill. Holidayshill. Brockis Hill, etc.
In woods. Common. Pileus wrinkled. Stem spindle-shaped.

**C. (Myx.) livido-ochraceus** Berk. (Lat., livid-ochre coloured).
Near Lyndhurst. Denny.
In woods. Uncommon.

**C. (Myx.) pluvius** Fr. (Lat., rainy, looking wet).
Costicles. Bank. Mark Ash. Knightwood. Ridley Wood.
In woods. Not uncommon.

Sub-genus III, *INOLOMA* Fr, (Gr., *is, inos*, fibre, *loma*, fringe, from the fringed veil). Pileus dry, usually scaly at first, flesh thick, equal. Stem fleshy, somewhat bulbous.

**C. (Ino.) argentatus** (Pers.) Fr. (Lat., silvered).
Near Lyndhurst Road Station.
In woods. Uncommon.

**C. (Ino.) albo-violaceus** (Pers.) Fr. (Lat., whitish violet).
Bank Bolderwood. Church Place Inclosure.
In woods. Not uncommon.

**C. (Ino.) bolaris** (Pers.) Fr. (Lat., marked, from its red scales).
Near Lyndhurst.
In woods. Uncommon.

**C. (Ino.) pholideus** Fr. (Gr., scaly).
Near Burley. Near Lyndhurst Road Station.
In woods, generally under birches. Not common.

Sub-genus IV. *DERMOCYBE* Fr. (Gr., *derma*, skin, *kube*, head, from the thin pileus). Pileus dry, silky, glabrous when adult, flesh thin, equal. Stem equal or diminishing upwards.

**C. (Dermo.) ochroleucus** (Schaeff.) Fr. (Gr., yellowish white).
Bank. Lyndhurst Road. Ironshill.
In woods. Not uncommon.

**C. (Dermo.) tabularis** (Bull.) Fr. (Lat., table-like; from the cap).
Ramnor. Bank. Mark Ash. Church Place Inclosure. Ridley Wood.
In woods. Not uncommon. P. flat. G. at first whitish.

**C. (Dermo.) camurus** Fr. (Lat., crooked; from the stem).
Ramnor. Denny.
In woods. Uncommon.

**C. (Dermo.) diabolicus** Fr. (Lat., fiendish; from its doubtful claim to its position here).
Near Lyndhurst.
In woods. Rare.

**C. (Dermo.) caninus** Fr. (Lat., of a dog—common).
Queen's Bower. Bolderwood. Rhinefield. Denny. Church Place Inclosure. Holmsley. Holmhill.
In woods. Frequent. Edible. Resembles *C. tabularis*, but gills purplish from the first.

**C. (Dermo.) myrtillinus** (Bolt.) Fr. (Lat., myrtle-like [colour]).
Near Lyndhurst.
In woods. Rare.

**C. (Dermo.) anomalus** Fr. (Lat., irregular).
Ramnor. Whitley Wood. Denny.
In woods and under oaks. Not uncommon.

**C. (Dermo.) spilomeus** Fr. (Lat., a speck or stain; from the variegated stem).
Near the Knightwood Oak.
In woods. Uncommon.

**C. (Dermo.) lepidopus** Cke. (Gr., scaly stemmed).
Near Lyndhurst. Ramnor. Mark Ash. Knightwood. Holmhill.
In woods and under oaks in pastures. Not uncommon. Like *anomalus*, but stem with a series of rings.

**C. (Dermo.) miltinus** Fr. (Lat., lead-colour).
Buskett's Wood.
In woods. Not common.

**C. (Dermo.) cinnabarinus** Fr. (Lat., dragon's blood, vermilion).
Rhinefield. Costicles. Mark Ash. Brockis Hill. Hollands Wood. Holmhill.
In woods. Frequent. Known from *C. sanguineus* by the unequal margin of gills and smell of radishes.

**(Dermo.) sanguineus** Fr. (Lat., blood-coloured).
Rhinefield. Buskett's Wood. Burley New Inclosure.
In woods. Not uncommon.

**C. cinnamomeus** Fr. (Lat., cinnamon-coloured).
Denny Wood. Busketts. Burley. Holmsley. Holmhill. Mark Ash. Rhinefield, etc.
In woods. Common.

var. **croceus** Fr. (Lat., saffron-coloured).
Brockis Hill. Denny Wood. Burley.

var. **semisanguineus** Fr. (Lat., half-bloody).
Bolderwood. Denny. Holmsley. Burley. Holmhill.
In woods. Frequent. Cap cinnamon, gills blood-red.

**C. (Dermo.) orellanus** Fr. (Lat., gold-like ?).
Near Cadnam.
Under trees. Rare.

**C. (Dermo.) cotoneus** Fr. (Lat., cottony, from the somewhat velvety cap).
Denny Lodge Inclosure.
In woods. Uncommon. Olive-coloured.

**C. (Dermo.) raphanoides** (Pers.) Fr. (Gr., radish-like, from its odour).
Near Lyndhurst. Brockis Hill. Ironshill.
In woods. Uncommon. Olive-tinted, velvety.

Sub-genus V. *TELAMONIA* Fr. (Gr., *telamon*, a bandage). Chiefly known by the characteristic stem, which is banded, or scaly below. Flesh of cap thin, or when thick in centre becoming suddenly thin.

**C. (Tela.) macropus** (Pers.) Fr. (Gr., long-stemmed).
Queen's Bower.
In woods. Rare.

**C. (Tela.) torvus** Fr. (Lat., wild, savage ; apparently in contradistinction to *C. urbicus*).
Bolderwood. Church Place Inclosure. Denny Wood. Burley New Inclosure.
In woods. Not uncommon. Distinctly peronate, or booted.

**C. (Tela.) armillatus** Fr. (Lat., ringed ; from the red zones on the stem).
Denny Wood.
In woods. Uncommon. Edible.

**C. (Tela.) haematochelis** (Bull.) Fr. (Gr., with a blood-red zone).
Near Lyndhurst.
In woods. Uncommon. Edible.

**C. (Tela.) hinnuleus** (Sow.) Fr. (Lat., of a young stag ; fawn-coloured).
Denny Wood. Holmsley. Ivy Gutter. Mark Ash. Ridley Wood.
In woods and among grass. Frequent. Acutely umbonate. Gills broad, distant.

**C. (Tela.) helvelloides** Fr. (Gr., like a *Helvella*).
Near Lyndhurst.
In woods. Rare.

**C. (Tela.) brunneus** (Pers.) Fr. (Lat., brownish).
Denny. Buskett's Wood. Mark Ash.
In woods, chiefly under conifers. Not uncommon.

**C. (Tela.) brunneo-fulvus** Fr. (Lat., brownish-fawn-coloured).
Ramnor.
In woods. Uncommon.

**C. (Tela.) glandicolor** Fr. (Lat., acorn-coloured).
Near Lyndhurst.
In woods. Rare.

**C. (Tela.) flexipes** (Pers.) Fr. (Lat., with a bent foot, or stem).
Buskett's Wood.
In woods. Uncommon.

**C. (Tela.) incisus** (Pers.) Fr. (Lat., cut into, which the pileus becomes).
Buskett's Wood. Burley New Inclosure.
In woods. Not common.

**C. (Tela.) hemitrichus** (Pers.) Fr. (Gr., half hairy).
Buskett's Wood. Brockis Hill. Mark Ash. Ridley Wood.
In woods and under birches. Frequent. Fibrils on margin.

**C. (Tela.) rigidus** (Scop.) Fr. (Lat., firm).
Ramnor. Ivy Gutter.
In woods and swampy places. Not common.

**C. (Tela.) paleaceus** (Weinm.) Fr. (Lat., full of chaff, scaly).
Church Place Inclosure. Costicles. Knightwood.
In woods. Not uncommon. Sprinkled with small white scales.

Sub-genus VI. *HYDROCYBE* Fr. (Gr., *hudor*, water, *kube*, head; from the moist pileus). Cap pale when dry, flesh very thin. Stem rather rigid.

**C. (Hydro.) subferrugineus** Fr. (Lat., rather rust-coloured).
Buskett's Wood.
In woods. Uncommon.

**C. (Hydro.) saturninus** Fr. (Lat., of Saturn, gloomy, dark).
Near Lyndhurst.
In woods. Rare.

**C. (Hydro.) castaneus** (Bull.) Fr. (Lat., chestnut—the colour).
Ramnor. Costicles. Church Place Inclosure. Woodfidley. Holmhill.
In woods and pastures. Not uncommon. Edible.

**C. (Hydro.) bicolor** Cke. (Lat., of two colours).
Near Lyndhurst. Denny Wood.
In woods. Uncommon. Stem violet at base, whitish above.

**C. (Hydro.) colus** Fr. (Lat., distaff-thread; from the character of the stem).
Bolderwood.
In woods. Uncommon.

**C. (Hydro.) jubarinus** Fr. (Lat., radiant).
Hollands Wood. Denny. Near Lyndhurst. Holmhill.
In woods. Not uncommon.

**C. (Hydro.) dolobratus** Fr. (Lat., mattock-shaped).
Ramnor. Ironshill.
In woods. Uncommon.

**C. (Hydro.) rigens** (Pers.) Fr. (Lat., stiffening, rigid).
Denny. Near Lyndhurst.
In woods. Not common.

**C. (Hydro.) leucopus.** (Gr., with a white foot, or stem).
Ramnor. Denny Wood. Mark Ash. Ridley Wood.
In woods. Frequent.

**C. (Hydro.) erythrinus** Fr. (Gr., red).
Knightwood.
In woods. Not common.

**C. (Hydro.) decipiens** (Pers.) Fr. (Lat., deceptive, resembling others).
Church Place Inclosure. New Copse. Ramnor. Perry Wood Inclosure. Holmhill. Brockis Hill, etc.
In woods. Common. Stem with a separable skin.

**C. (Hydro.) obtusus** Fr. (Lat., blunted; from the disappearing umbo).
Ramnor. Bank. Denny Wood.
In woods. Not common.

**C. (Hydro.) acutus** Fr. (Lat., sharp, pointed; from the umbo).
Ramnor. Church Place Inclosure. Denny. Ivy Gutter.
In woods. Not uncommon.

Genus 38. **PAXILLUS** Fr. (Lat., a small stake, a peg). Gills decurrent, easily separating from the hymenophore. Spores rusty or dirty white.

**P. paradoxus** Berk. (Gr., strange, unexpected).
Denny Lodge. Inclosure.
On the ground under trees. Rare. Known by the dark pileus and bright yellow gills.

**P. involutus** (Batsch) Fr. (Lat., rolled inwards; from the margin of the pileus).
Woodfidley. Hollands Wood. Tantany Wood. Mark Ash. Bolderwood. Gritnam. Dearleap, etc., etc.
In woods, etc. Very common. Edible but hardly palatable.

**P. panuoides** Fr. (Gr., like *Panus* i.e. shell-shaped).
Rhinefield.
On rotten rails, etc. Uncommon.

Series IV. Melanosporæ.
Spores black, purple-black, brown-black, etc.

Genus 39. **AGARICUS** (Gr., *Agarikon*, a region of Sarmatia). Gills free. Stem fleshy, ringed. Spores mostly purple-brown.

**A. arvensis** (Schaeff.) (Lat., of cultivated land). "Horse Mushroom."
Near Lyndhurst. Near Stubbs Wood. Denny.
In pastures under trees. Not common in the Forest. Edible, and considered by most mycophagists as superior in flavour to *A. campestris*.

**A. campestris** (Linn.) Fr. (Lat., belonging to a level field). "Common Mushroom."
Ashurst. Mark Ash. Tantany Wood. Denny. Holmsley. Balmer Lawn. Allum Green. Minstead, etc.
In fields, etc. Widely distributed, but not abundant.

var. **silvicola** (Vitt.) Fr. (Lat., growing in woods). "Wood Mushroom."
Near Lyndhurst.
In woods. Not common.

**A. haemorrhoidarius** Kalchbr. (Gr., discharging blood). "Blood Mushroom."
Ramnor. Ironshill.
In woods, chiefly under conifers, and in pastures. Uncommon. Known by the brown pileus, and the flesh turning to blood colour. The finest in flavour of all our mushrooms.

Genus 40. **STROPHARIA** Fr. (Gr., *strophos*, a sword-belt, referring to the ring). Gills adnate or adnexed, with a distinct ring. Spores mostly purple-brown.

**S. aeruginosa** (Curt.) Fr. (Lat., verdigris, from the colour of the gluten).
Costicles. Dearleap Plantation. New Copse. Ridley Wood. Gritnam. Helmhill. Knightwood, etc.
In woods, pastures, and rubbish heaps. Common. Poisonous.

**S. albo-cyanea** (Desm.) Fr. (Lat., white and sea-blue).
Near Lyndhurst.
In woods. Not common. Like *aeruginosa*, but smaller and not scaly below the ring.

**S. inuncta** Fr. (Lat., anointed, besmeared, from its being at first glutinous).
Near Lyndhurst Road Station. Knightwood. Holmsley.
In woods, etc. Not common.

**S. squamosa** Fr. (Lat., full of scales).
Knightwood, Near Cadnam. Denny Lodge Inclosure. Mark Ash. Church Place Inclosure.
In woods. Not uncommon.

var. **aurantiaca** Cke. (Lat., orange-coloured).
Near Lyndhurst. In woods. Uncommon.

**S. merdaria** Fr. (Lat., belonging to dung).
New Copse. Bank. Busketts. Balmer Lawn. Holmsley.
On dry dung in woods, etc. Frequent.

**S. stercoraria** Fr. (Lat., of dung).
Denny Lodge Inclosure. Ironshill. Pig Bush.
On dung in pastures. Not common; probably confounded with *S. semiglobata.*

**S. semiglobata** (Batsch) Fr. (Lat., hemispherical; from the pileus).
Costicles. Holmsley. Denny Heath. Ivy Gutter. Mark Ash. Holmhill. Pig Bush. Knightwood, etc., etc.
On dung throughout the year. Very common.

Genus 41. **HYPHOLOMA** Fr. (Gr., *huphe*, a web, *loma*, a fringe, from the partial veil being often apparent at the margin of the pileus). Gills adnate or sinuate. Corresponds with *Tricholoma*, *Entoloma*, and *Hebeloma*, but spores brownish-purple, sometimes intense purple.

**H. silaceum** (Pers.) Fr. (Lat., like ochre).
Buskett's Lawn.
On the ground. Rare.

**H. sublateritium** (Schaeff). Fr. (Lat., almost brick-coloured).
Denny Wood. Dearleap Plantation. Ramnor. Minstead. Mark Ash. Holmsley. Holidayshill, etc.
On and about old stumps in woods and hedgerows. Common. Poisonous. Autumn and winter. Gills pallid, then dingy olive. Often large.

**H. capnoides** Fr. (Gr., smoke-like; from the colour of the gills).
Holmsley. Burley New Inclosure. Buskett's Wood. Dearleap. Rhinefield. Holmhill.
In pine woods and on pine trunks. Frequent.

**H. epixanthum** (Paul.) Fr. (Gr., yellowish-brown).
Denny Lodge Inclosure. Ashurst. Rhinefield. Queen's Bower. Pig Bush. Dearleap.
On old fir stumps, etc. Not uncommon. Gills pale yellow, then greyish.

**H. fasciculare** (Huds.) Fr. (Lat., in little bundles; from its tufted habit).
Brockenhurst Park. Woodfidley. Dearleap. Rhinefield. Tantany Wood. Ivy Gutter. Balmer Lawn. Ridley, etc., etc.
On old stumps throughout the year. Very common. Poisonous. Gills sulphur-coloured, then greenish. Stem and flesh yellow.

**H. storeum** Fr. (Lat., a mat; from the texture of the pileus).
Bolderwood.
On decayed beech trunks. Rare.

**H. cotoneum** Quél. = *H. hypoxanthum* Ph. and Plow. (Lat., cottony).
Denny Lodge Inclosure.
Under beeches. Rare.

**H. velutinum** (Pers.) Fr. (Lat., velvety).
Denny Lodge Inclosure. Church Place Inclosure. New Copse. Ridley Wood.
In fields, woods and roadsides. Frequent.

**H. appendiculatum** (Bull.) Fr. (Lat., with small appendages; from the remains of the veil on the margin of the pileus).
Ramnor. Black Down. Church Place Inclosure. Burley. Holmhill.
In woods and shady places. Not uncommon.

**H. hydrophilum** (Bull.) Fr. (Gr., loving water, which exudes from the gills).
Buskett's Lawn. Mark Ash. Denny Lodge Inclosure. Holmhill. Knightwood, etc.
On stumps in woods, etc. Common.

Genus 42. **PSILOCYBE** Fr. (Gr., *psilos*, naked, *kube*, head, no veil being apparent on the pileus). Stem tough. Margin of pileus incurved at first. Corresponds with *Collybia*, *Leptonia* and *Naucoria*, but spores purple, purple-brown, or slate-colour.

**P. ericæa** (Pers.) Fr. (Gr., growing on heaths).
Holmsley. Ashurst. Racecourse. Ironshill. Denny Heath. Pig Bush. Brockis Hill. Mark Ash. Whitemoor, etc.
In heathy places. Common. Gills broadly attached. Stem pallid.

**P. sub-ericæa** Fr. (Lat., rather like *P. ericæa*).
Rhinefield. Holmsley.
On moist heaths, etc. Uncommon, but probably confounded with *P. ericæa*, from which it differs in the shorter stem, gills narrowly attached, and yellowish cap.

**P. uda** (Pers.) Fr. (Lat., damp; from the habitat).
Costicles. Denny. Holmsley. Dearleap.
In boggy ground. Not uncommon.

**P. ammophila** (Dur. and Lév.) (Gr., loving sand).
Denny Heath.
In sandy ground. Uncommon.

**P. semilanceata** Fr. (Lat., almost lance-shaped). "Liberty Cap."
Denny Heath. Ridley. Rhinefield. Woodfidley. Dearleap. New Copse. Balmer Lawn. Bank. Emery Down. Mark Ash, etc.
In pastures, roadsides, etc. Very common. Poisonous.
var. **cærulescens** Cke. (Lat., becoming blue, bluish).
Costicles.
Among grass. Uncommon. Base of stem bluish.

**P. spadicea** Fr. (Lat., date-brown).
Ashurst Wood. Dearleap. Rhinefield. Mark Ash. Holmsley Inclosure. Near Lyndhurst Road Station. Emery Down.
About stumps. Frequent. Resembles *Hypholoma hydrophilum*, but gills tinged rose.

**P. fœnisecii** (Pers.) Fr. (Lat., of cut hay; from its appearing on lawns, etc.).
Near Lyndhurst. Near Palmer's Water. Balmer Lawn. Mark Ash.
Among short grass. Common. Edible.

Genus 43. **PSATHYRA** (Gr., *psathuros*, friable, falling to pieces). Stem cartilaginous, hollow, fragile. Conical or bell-shaped. Margin at first straight. Agree with *Mycena*, *Nolanea*, *Galera*, *Psathyrella*, but spores dark purple-brown, approaching slate-colour.

**P. corrugis** Pers. (Lat., wrinkled—in the disc).
Brockis Hill. Near Minstead. Busketts.
In woods, etc. Frequent.

**P. fibrillosa** (Pers.) Fr. (Lat., full of fibrils).
Costicles. Lyndhurst. Matley. Mark Ash. Woodhurst.
In woods on the ground or on twigs. Not uncommon.

Genus 44. **BOLBITIUS** Fr. (Gr., *bolbition*, cow-dung, a frequent habitat). Fragile. Gills dissolving. Spores rust-colour.

**B. tener** Berk. (Lat., tender, fragile).
Near Lyndhurst.
Among short grass. Uncommon in the Forest.

Genus 45. **COPRINUS** Pers. (Gr., *copros*, dung, the usual habitat). Gills dissolving into a black fluid. Spores black.

**C. comatus** (Fl. Dan.) Pers. (Lat., shaggy). "Maned Agaric." "Lawyer's Wig."
Rhinefield. Lyndhurst. Boldre.
Among grass in fields, gardens, woods, and especially abundant near refuse tips. Not common in the Forest. Edible and delicious.

**C. atramentarius** Fr. (Lat., inky; from its melting into a black fluid).
Bolderwood. Picket Post. Ridley Wood.
In fields and woods, usually near roots. Not uncommon. Edible and delicious.

**C. picaceus** (Bull.) Fr. (Lat., magpie-like; variegated black and white).
Bolderwood. Buskett's Wood.
In woods. Not common. Poisonous.

**C. cinereus** (Schaeff.) Fr. (Lat., ash-coloured.)
New Copse.
Under trees. Uncommon.

**C. niveus** Pers. (Lat., snow-white).
Near Lyndhurst. Mark Ash. Ramnor. Denny Lodge Inclosure. Tantany Wood. Burley.
On horse-dung in fields and woods through the greater part of the year. Common.

**C. micaceus** (Bull.) Fr. (Lat., covered with bright particles).
Denny Lodge Inclosure. Bank. Ivy Copse. Mark Ash. Rhinefield. Burley. Ridley, etc.
On and about stumps, roots, palings, etc. Very common.

**C. papillatus** (Batsch) Fr. (Lat., with nipples).
Near Lyndhurst.
On dung. Rare.

**C. deliquescens** (Bull.) Fr. (Lat., dissolving).
Near Lyndhurst. Ivy Gutter.
In woods and hedgerows. Not common.

**C. radiatus** (Bolt.) Pers. (Lat., like the spokes of a wheel).
Ramnor. Buskett's Wood. Mark Ash.
On dung and manure heaps. Not common.

**C. Friesii** Quél. (In honour of Elias Fries).
Nomansland.
On grass. Rare.

**C. ephemerus** (Bull.) Fr. (Lat., lasting but for a day).
Queen's Bower.
On manure heaps. Not common. Resembles *C. plicatilis* but disc prominent.

**C. plicatilis** (Curt.) Fr. (Lat., in folds; from the cap).
Queen's Bower. Mark Ash. Woodhurst. Woodfidley. Balmer Lawn. Allum Green. Ridley Wood. Mark Ash, etc.
In pastures and woods. Very common. Disc depressed.

Genus 46. **PANÆOLUS** Fr. (Gr., *pan*, all, and *aiolos*, variegated, from the appearance of the gills). Pileus never striated or expanding. Margin exceeding the mottled gills. Spores black.

**P. phalaenarum** (Bull.) Fr. (Lat., of moths; from its likeness to *P. papilionaceus*).
Buskett's Wood. Ironshill. Denny Lodge Inclosure. Dearleap. Holmsley Inclosure.
In pastures on dung. Not uncommon. Differs from *P. papilionaceus* in the viscid and ochraceous cap.

**P. retirugis** Fr. (Lat., with a network of wrinkles, said of the pileus).
Hurst Hill. Denny Wood.
In pastures among grass or on dung. Not common. Differs from *Psathyra corrugis* in gills not being violet-tinted.

**P. sphinctrinus** Fr. (Gr., a tight band, because the gills never expand).
Brockis Hill.
In pastures and on dung. Not uncommon. Near the next but stem grey.

**P. papilionaceus** (Bull.) Fr. (Lat., butterfly-like).
Near Lyndhurst. Ivy Gutter. Mark Ash. Balmer Lawn. Queen's Bower.
In pastures, gardens and on dung. Not uncommon. Like the next, but pileus hemispherical. Stem pale. Gills broadly adnate.

**P. campanulatus** (Linn.) Fr. (Lat., like a little bell).
Holmsley Inclosure. Mark Ash. Buskett's Wood. Minstead. New Copse. Racecourse. Ridley, etc.
On dung in pastures and woods. Common. Stem reddish, at first powdered with white meal.

Genus 47. **ANELLARIA** Karst. (Lat., *anellus*, a little ring, from the ring on the stem). Allied to *Panæolus* but with a ring.

**A. separata** (Linn.) Karst. (Lat., separated, lonely, not gregarious).
Brockis Hill. Obere. Denny Wood. Beaulieu Heath. Dearleap.
In pastures and woods, chiefly on horse dung. Common.

**A. fimiputris** (Bull.) Karst. (Lat., decaying manure ; from the habitat).
Near Lyndhurst. Ironshill.
In pastures, roadsides, etc., on dung. Not common.

Genus 48. **PSATHYRELLA** Fr. (Gr., *psathuros*, friable). Pileus striated, margin straight, not exceeding gills. Spores black.

**P. gracilis** (Pers.) Fr. (Lat., slender).
Denny Wood. Ivy Gutter. Balmer Lawn.
Roadsides, pastures, etc. Not noticed as common. Gills broadly attached, edged rose. Rather tough.

**P. atomata** Fr. (Lat., covered with [shining] atoms).
Grig's Lane. Matley Heath. Rhinefield. Pig Bush.
Roadsides, pastures, gardens, etc. Not common in the Forest. Stem wavy, fragile.

**P. disseminata** (Pers.) Fr. (Lat., scattered abroad).
Buskett's Wood. Queen's Bower. Hollands Wood. Mark Ash. Ridley Wood. Gritnam.
Among moss on old stumps, etc., densely tufted. Frequent.

Genus 49. **GOMPHIDIUS** Fr. (Gr., *gomphos*, a large bolt or nail, from the peg-top shape of the pileus). A peculiar genus, with soft, decurrent gills, more or less dingy olive at maturity.

**G. glutinosus** (Schaeff.) Fr. (Lat., full of glue ; glutinous).
Ramnor. Mark Ash.
Under conifers. Not common. Flesh of stem yellow at base, white above.

**G. viscidus** (Linn.) Fr. (Lat., sticky).
Near Lyndhurst. Knightwood. Ashurst. Denny Lodge Inclosure. New Copse.
Under conifers. Not uncommon. Flesh of stem wholly rhubarb-colour.

**G. roseus** Fr. (Lat., rose-coloured).
Brockis Hill. Woodfidley.
Under conifers. Not common.

**G. gracilis** Berk. (Lat., slender).
Mark Ash.
Under conifers. Not common. Cap stained black. Stem streaked.

## Family II. POLYPORACEÆ Fr. (" Pore Fungi.")

Spore-surface lining tubes or depressions.

Genus 1. **BOLETUS** Linn. (Gr. *bolos*, a clod, from the round form of the pileus. Mushroom shape, but hymenium porous, easily separating from hymenophore.

**B. luteus** Fr. (Lat., pale yellow ; the colour of the cap under the dark gluten).
Holmsley, Ashurst, Denny Heath, Ironshills. Rhinefield. Dearleap. New Copse. Holmhill. Perry Wood, etc.
Margins of pine woods, etc. Very common. Edible. but texture soft.

**B. elegans** Schum. (Lat., elegant, from the shape).
Burley New Inclosure.
In pine woods, etc. Not observed to be common. Resembles *B. flavus*, but pore-openings minute.

**B. flavus** With. (Lat., golden-yellow).
Holmsley. Dearleap Plantation. Denny. Busketts. Rhinefield. Queen's Bower. Holmhill, etc.
Margins of pine, woods, etc. Common. Edible, but mucilaginous. Pores large, angular.

**B. flavidus** Fr. (Lat., inclining to golden-yellow).
Near Lyndhurst. Under trees. Rare.

**B. granulatus** Linn. (Lat., with granules—on the pore-divisions).
Whitley Wood. Church Place Inclosure.
Under pines. Not common. Edible and excellent. Allied to *B. luteus*, but known by the absence of a ring.

**B. tenuipes** Cke. (Lat., thin-stemmed).
Near Lyndhurst. Under trees. Uncommon.

**B. bovinus** Linn. (Lat., of an ox; from the reddish buff cap).
Buskett's Wood. Setley. Dearleap. New Copse. Rhinefield. Ridley. Holmhill. Mark Ash, etc.
On heaths and under gorse and pines. Common. Edible, but very mucilaginous.

**B. badius** (Linn.) Fr. (Lat. bay-coloured; reddish brown).
Stubbs Wood. Mark Ash. Queen's Bower. Whitley Wood. Buskett's Wood. Dearleap. Ridley Wood. Rhinefield. Brockis Hill, etc.
In woods, chiefly under conifers. Common. Edible. Pores yellowish, staining dull green when handled.

**B. piperatus** Bull (Lat., peppery; from the taste).
Buskett's Lawn. Brockis Hill. Denny. Ironshill.
In woods, chiefly under woods. Not uncommon. Poisonous. Resembles *B. bovinus*, but base of stem bright yellow.

**B. variegatus** Swartz. (Lat., variegated; from the speckled cap).
Dearleap Plantation. Ironshill. Perry Wood. Mark Ash. Whitemoor.
In woods, etc., chiefly under pines. Frequent.

**B. chrysenteron** Bull (Gr., gold-coloured within; from the flesh).
Rhinefield. Ridley. Knightwood. Holmsley. Dearleap. New Copse Mark Ash. Queen's Bower.
In woods, etc. Common. Edible but rather mucilaginous. Cap with red cracks.

**B. subtomentosus** Linn. (Lat., rather woolly; from the pileus being downy).
Dearleap. Queen's Bower. Ramnor. Hollands Wood. Gritnam. Mark Ash. Ridley.
In woods, etc. Common. Edible but rather mucilaginous. Cracks yellow.

**B. calopus** Fr. (Gr. beautiful foot; from the bright red and yellow stem).
Near Lyndhurst. Ironshill. Denny Wood.
In dense woods. Not common. Like *B. subtomentosus*, but stem netted.

**B. pachypus** Fr. (Gr., thick stem).
Near Lyndhurst. Holmsley Inclosure.
In woods. Uncommon.

**B. candicans** Fr. (Lat., shining white).
Woodlands Inclosure. Ashurst. Church Place Inclosure. Burley.
In woods. Not uncommon. Like *B. edulis*, but whitish.

**B. edulis** Bull. (Lat., eatable).
Buskett's Wood. Woodhurst. Dearleap. Tantany Wood. Hollands Wood. Mark Ash. Bolderwood. Holmhill. Burley, etc.
In woods and on commons. Edible; one of the best. Cap like a penny bun. Stem thick, upper part netted white. Pores white then yellowish-green.

**B. aereus** Bull. (Lat., coppery).
Allum Green.
Under trees. Rare.

**B. fragrans** Vitt. (Lat., sweet-scented).
Ironshill Inclosure. Stubbs Wood.
In woods. Uncommon. Resembles *edulis*, but stem and flesh are yellow.

**B. satanas** Lenz. (Gr., satanic, from its deadly effects).
Near Lyndhurst. Stubbs Wood.
In woods. Uncommon. Poisonous. Cap pale, stem bulbous, pore-openings crimson, flesh yellow changing to bright blue and pink, at base of stem sometimes crimson.

**B. luridus** Schaeff (Lat., lurid).
Rhinefield. Mark Ash. Woodfidley. Ramnor. Busketts. Ashurst. Denny. Holmhill. Holmsley, etc.
In woods, etc. Common. Poisonous (?). Cap always darker than *satanas*, pore-openings more vermilion, flesh when cut instantly turns indigo-blue. Stem thick, spindle-shaped or bulbous.

var. **erythropus** (Pers.) Fr.
Brockis Hill. New Copse.
In woods, etc. Not common. Smaller. Stem thinner, equal, not netted.

**B. purpureus** Fr.
Near Lyndhurst.
In woods. Rare. Poisonous.

**B. laricinus** Berk. (Lat., of larches).
Bolderwood. Rhinefield.
In woods under larches. Not common. Edible, but very mucilaginous.

**B. rubiginosus** Fr. (Lat., rusty).
Near Lyndhurst 1887, sole record for Britain.
On the ground in beech woods. Very rare.

**B. duriusculus** Schulz. (Lat., referring to its hardness).
Buskett's Wood. Woodlands Inclosure.
In woods. Rather uncommon. Edible. Differs from *B. scaber* in yellow pores and flesh coppery when broken.

**B. versipellis** (Lat., changing skin).
Denny Lodge Inclosure. Ironshill. Gritnam. Woodhurst.
In woods and heaths. Not uncommon. Edible. Cap rufous-orange. Differs from *B. scaber* in the downy cap and grey pores.

**B. scaber** Bull (Lat., rough; from the scaly stem).
Tantany Wood. Ridley. Mark Ash. Rhinefield. Buskett's Wood. Setley. Hollands Wood. Queen's Bower. Ashurst, etc.
In woods and on heaths. Very common. "Edible but mucilaginous" (Rea). "Edible, flavour excellent" (Massee). Cap variously coloured, smooth; pores white, then dingy brownish-olive.

**B. castaneus** Bull. (Lat., chestnut).
Near Lyndhurst.
In woods. Uncommon. Edible.

Genus 2. **FISTULINA** Bull, (Lat., *fistula*, a pipe, from the character of the tubes). Tubes free of each other.

**F. hepatica** (Huds.) Fr. (Gr., of the liver; from its appearance). "Vegetable Beefsteak."
Tantany Wood. Knightwood. Ridley Bank. Brockis Hill. Brockenhurst Park. Hollands Wood. Ashurst.
On and inside old oaks. Common. Edible, but flavourless, except when young, when it is unpleasant.

Genus 3. **POLYPORUS** Mich. Gr. *polus*, many, *poros*, a pore, from the character of the hymenium. Tubes not separate from hymenophore. Stem usually lateral or absent. Frequently hard or tough, but soft at first.

**P. lentus** Berk. (Lat., tough, pliant).
Park Hill. Denny Lodge Inclosure.
On gorse. Not common.

**P. Schweinitzii** Fr. (In honour of L. D. von Schweinitz).
Beaulieu Road. Mark Ash. Shifter's Inclosure. Denny. Dearleap. Holmhill.
In pine woods, about roots and stumps. Rather frequent. Spongy. Cap woolly, pores greenish-yellow, stem usually central.

**P. rufescens** (Pers.) Fr. (Lat., becoming reddish).
Buskett's Wood. Queen's Bower.
In woods, on buried roots and stumps. Not uncommon.

**P. squamosus** (Huds.) Fr. (Lat., scaly; from the cap).
Wootton. Knightwood.
On ash, etc. Not common in the Forest. Stem black.

**P. elegans** (Bull.) Fr. (Lat. elegant).
Pine-wood near Palmer's Water. On fallen branches of pine. Uncommon. Small, flat, roundish; stem black.

**P. frondosus** (Fl. Dan.) Fr. (Lat., leafy).
Near Cadnam.
On stumps, etc. Uncommon. Much branched; caps grey, white beneath.

**P. intybaceus** Fr. (Lat., of chicory, from its flavour).
Near Lyndhurst. Queen's Bower. Pig Bush.
On stumps, etc. Not common. Much branched; caps brown, whitish-brown beneath.

**P. giganteus** (Pers.) Fr. (Lat. gigantic).
Brockis Hill. Brockenhurst. Stubbs Wood. Denny Lodge Inclosure. Bolderwood. Gritnam.
At base of trees, chiefly beech. Frequent. Stains black.

**P. sulphureus** (Bull) Fr. (Lat., sulphur-coloured).
Queen's Bower. Rushpole Wood. Costicles.
On trunks. Not common. A destructive parasite.

**P. alutaceus** Fr.
Mallard Wood. On alder. Uncommon.

**P. fragilis** Fr. (Lat., easily broken).
Beaulieu Road.
On stumps and fallen branches of conifers. Not common. Whitish; foxes when handled.

**P. caesius** (Schrad.) Fr. (Lat., bluish grey).
Ramnor. Mark Ash.
On old stumps. Not common. White, tinged blue.

**P. mollis** Fr. (Lat., soft).
Costicles.
On pine stumps. Not uncommon. Pores white, reddish when touched.

**P. rutilans** (Pers.) Fr. (Lat., glowing red).
Queen's Bower. Ironshill. Burley.
On dead branches of poplar and birch. Not common. Scent of anise.

**P. nidulans** Fr. (Lat., nest-building; prob. from its appearance).
Ashurst Wood.
On trunks and fallen branches. Uncommon.

**P. adustus** (Wild). Fr. (Lat., scorched, in allusion to the dark hymenium).
Knightwood. Holmsley. Denny. Mark Ash. Perry Wood. Ridley Wood. Woodfidley. Queen's Bower, etc.
On old stumps, felled trunks, etc. Very common. Pores grey.

**P. crispus** (Pers.) Fr. (Lat., curled).
Near Blackwater.
On stumps. Uncommon.

**P. amorphus** Fr. (Gr., shapeless).
Costicles. Woodland's Inclosure. Rhinefield. Ramnor. Holmsley, etc.
On rotten pine-wood, or running over pine-needles on the ground. Common. Pileus white. Pores golden-yellow. Thin.

**P. spongia** Fr. (Lat., a sponge).
Woodland's Inclosure. Brockis Hill.
On dead pine-stumps. Uncommon. Like *Schweinitzii*, but without a stem.

**P. cuticularis** (Bull.) Fr. (Lat., with a little skin).
Bolderwood. Ashurst Wood. Denny.
On oaks, beeches and pines. Not uncommon. Near *P. hispidus*, colour lighter.

**P. hispidus** (Bull.) Fr. (Lat., bristly).
Denny Wood.
On ash, etc. Not common. Resembles *P. Schweinitzii*, but stemless.

**P. spumeus** (Sow.) Fr. (Lat., frothy).
Allum Green.
On rotten trunks. Uncommon.

**P. borealis** (Wahl.) Fr. (Lat., northern).
Mark Ash. Denny Lodge Inclosure. Holmhill.
On larch and pine stumps, etc. Uncommon.

**P. dryadeus** (Pers.) Fr. (Gr., of the oak).
Beaulieu Road. Ashurst.
On oaks. Not common. A destructive parasite.

**P. betulinus** (Bull.) Fr. (Lat., of the birch).
Tantany Wood. Mark Ash. Ramnor. Rhinefield. Woodhurst. New Copse. Ironshill. Whitley Wood, etc.
On dead and dying birches. Very common.

Genus 4. **FOMES** Fr. (Lat., *fomes*, tinder, which many of the species supplied). Pores stratose, each season's layer forming beneath the previous year's. Hard, woody.

**F. applanatus** (Pers.) Wallr. (Lat., flattened).
Tantany Wood. Bramble Hill. Mark Ash. Ridley Wood. Ashurst. Knightwood. Woodfidley. Brockis Hill, etc.
On beeches. Common. Brown, hard. Spores profuse, brown.

**F. fomentarius** (Linn.) Fr. (Lat., providing tinder; formerly made from it).
Stubbs Wood. Mark Ash. Ridley Wood.
On various trees. Not common. Brown, hard. Hoof-shaped. Spores colourless.

**F. igniarius** (Linn.) Fr. (including var. **pomaceus** Pers.) (Lat., providing fire, i.e. tinder).
Holmsley. Bolderwood. Ridley. Mallard Wood.
On various trees. Frequent. Top blackish. Very hard.

**F. ferruginosus** (Fr.) Mass. (Lat., rusty, from the colour).
Ridley Wood. Holmsley. New Copse.
On trunks and branches. Not uncommon. Spores uppermost.

**F. connatus** Fr. (Lat., attached together).
Hollands Wood. Near Lyndhurst.
On various trees. Not common.

**F. annosus** Fr. (Lat., long-lived). "Red Rot."
Ramnor. Bolderwood. Buskett's Wood. Dearleap Plantation. Ironshill. Perry Wood. Rhinefield, etc.
At the base of conifers and on their stumps. Common. Top brown. Flesh white.

Genus 5. **POLYSTICTUS** Fr. (Gr., *polus*, many, *stiktos*, pricked, from the appearance of the hymenium). Thin, leathery, fan-shaped or rarely central-stemmed.

**P. perennis** (Linn.) Fr. (Lat., lasting).
Wootton Inclosure. Holmsley. Near Palmer's Water.
On heaths and in burnt ground. Not common. Central stem. Bright rust-brown.

**P. radiatus** (Sow.) Fr. (Lat., rayed).
Buskett's Wood.
On trunks and stumps. Uncommon.

**P. versicolor** (Linn.) Fr. (Lat., changing colour).
Queen's Bower. Holmsley. Mark Ash. Ironshill. Minstead. Bolderwood. Woodfidley, etc., etc.
On trunks, fallen branches and sticks. Extremely common. Very variously coloured.

**P. abietinus** (Dicks.) Fr. (Lat., of the spruce).
Bolderwood. Vinney Ridge. Burley. Park Hill. Rhinefield. Ironshill. Mark Ash. Ridley.
On dead wood of conifers and birches. Very common. Top white, pores purple.

Genus 6. **PORIA** Pers. (Gr., *poros*, a passage, the plant being mainly composed of tubes). Entirely resupinate—a mere film or crust of pores.

**P. vulgaris** Fr. (Lat., common).
Near Lyndhurst. Holmsley.
On fallen branches. Not common in the Forest.

**P. mollusca** (Pers.) Fr. (Lat., softish).
Ramnor. Denny.
On fallen branches. Not common.

**P. medulla-panis** (Pers.) Fr. (Lat., crumb of bread).
Denny.
On rotten wood. Uncommon.

**P. vaporaria** Pers. (Lat., a flue; from the tubes).
Ramnor. Woodfidley. Ashurst. Holmsley. New Copse. Mark Ash. Ridley. Brockis Hill, etc.
On fallen twigs and branches. Very common. White to ochre-coloured. Pores large, angular.

**P. umbrina** Fr. (Lat., umber-coloured).
Queen's Bower. Knightwood. Denny. Burley New Inclosure. Tantany Wood.
On dead wood. Not uncommon. Brown; like *Fomes ferruginosus*, but not stratose.

Genus 7. **TRAMETES** Fr. (Lat., *trama*, weft, on which the generic distinction is based, the tubes being sunk into it and not forming a distinct layer). Pores oval or elongate.

**T. gibbosa** (Pers.) Fr. (Lat., humped).
Knightwood. Burley. Mark Ash. Denny Wood. Obere Corner.
On stumps and posts. Frequent. White.

**T. rubescens** (A. and S.) Fr. (Lat., becoming red, reddish).
Rhinefield, 1905. Beaulieu Road. Denny.
On felled and decaying beech and on sallows. Like *Dædaleæ confragosa*, but pores turn pink.

**T. mollis** (Sommerf.) Fr. (Lat., soft).
Knightwood.
On fallen branches. Uncommon.

Genus 8. **DÆDALEA** Pers. (From *Dædalus*, the maker of the labyrinth, in allusion to the sinuous and labyrinthiform tubes).

**D. quercina** (Linn.) Pers. (Lat., of the oak).
Whitley Wood. Bolderwood. Queen's Bower. Pig Bush. Ironshill. Gritnam. Mark Ash. Rhinefield,
On dead oak stumps and trunks. Common.

**D. confragosa** (Bolt.) Pers. (Lat., rugged, uneven).
Holmsley. Pig Bush.
On alders and sallows. Uncommon. Thinnish. Pores hardly sinuous.

Genus 9. **MERULIUS** Hall. (Lat., *merula*, a blackbird, on account of the colour of some species. Subgelatinous. Tubes very shallow, resembling irregularly united folds or wrinkles.

**M. tremellosus** Schrad. (Lat., quivering; from its jelly-like consistency).
Ridley Wood. Denny. Mark Ash.
On stumps and fallen branches. Not common.

**M. corium** (Pers.) Fr. (Lat., leather).
Rhinefield. Near Lyndhurst. Mark Ash.
On stumps and fallen branches, especially gorse. Frequent.

**M. lacrymans** (Jacq.) Fr. (Lat., weeping). "Dry-rot."
Near Lyndhurst.
On trunks, etc. Not common in the Forest.

Genus 10. **SOLENIA** Hoffm. (Gr., *solen*, a pipe, the shape of the plants). Minute, consisting of clusters of tubes.

**T. anomala** (Pers.) Fr. (Lat., irregular, because difficult to classify).
Ironshill. Denny.
On rotten wood. Not common.

## Family IV. HYDNACEÆ ("Hedgehog Fungi").
Spore-surface on spines or projections.

Genus 1. **HYDNUM** Linn. (Gr., *hudnon*, truffle). Spore-surface of teeth which are acute and distinct at the base.

**H. imbricatum** Linn. (Lat., tiled; the arrangement of the scales).
Bolderwood.
In pine woods. Uncommon.

**H. repandum** Linn. (Lat., turned up).
Denny Lodge Inclosure. Holmsley. Ironshill. Dearleap. Mark Ash. Ridley Wood. Holmhill. Hollands Wood, etc.
In woods. Common. Edible and delicious. Uniform pale pinkish tan.

**H. ferrugineum** Fr. (Lat., rust-coloured).
Burley New Inclosure.
In woods. Not common.

**H. Queletii** Fr. (In honour of Mons. L. Quélet).
Knightwood, 1899.
In woods. Rare.

**H. cyathiforme** Schneff. (Lat., cup-shaped).
Knightwood.
In fir woods. Rare.

**H. auriscalpium** Linn. (Lat., an ear-pick).
Costicles. Poundhill. Brockenhurst Park. New Copse. Holmhill.
On fir-cones. Not uncommon.

**H. erinaceum** Bull. (Lat., hedgehog-like).
Near Lyndhurst.
On trunks. Rare. Edible.

Genus 2. **TREMELLODON** Pers. (Gr., *odous*, *odontes*, tooth, and from its resembling *Tremella* in substance). Tongue-shaped.

**T. gelatinosum** (Scop.) Fr. (Lat., jelly-like).
Rhinefield. Ironshill. Costicles. Ramnor.
On pine stumps. Not uncommon. Edible.

Genus 3. **IRPEX** Fr. (Lat., a harrow; from the arrangement of the teeth). Spore surface uppermost, springing from folds or ridges.

**I. obliquus** (Schr.) Fr. (Lat., slanting).
Near Lyndhurst. Knightwood. Ridley Wood. Mark Ash. Denny Lodge Inclosure.
On fallen branches, etc. Frequent. Like *Poria vaporaria* with torn pores, but coarser.

Genus 4. **RADULUM** Fr. (Lat., *radix*, a root, from the appearance of the projections. Spore-surface uppermost, of coarse, deformed tubercles.

**R. orbiculare** Fr. (Lat., circular: the outline of the patches).
Near Lyndhurst. Bolderwood.
On fallen branches of alder, birch and firs. Not common.

**R. quercinum** (Pers.) Fr. (Lat., of the oak).
New Copse.
On fallen branches of oak. Uncommon. Tubercles bearing minute spines.

Genus 5. **PHLEBIA** Fr. (Gr. *phlebs*, a vein, from the appearance of the species). Spore-surface uppermost, in folds or wrinkles. Orange-coloured.

**P. merismoides** Fr.
Buskett's Wood. Burley. Mark Ash. Tantany Wood.
On mossy stumps. Not common.

**P. radiata** Fr. (Lat., rayed).
Mallard Wood.
On decaying birch and alder. Not common.

Genus 6. **ODONTIA** Pers. (Gr. *odous, odontes*, tooth, from the appearance of the spore-surface). Covered with granules divided at apices.

**O. fimbriata** Pers. (Lat., fringed).
Denny.
On rotten wood. Uncommon. Fawn-coloured.

Genus 7. **GRANDINIA** Fr. (Lat., *grando*, hail, from the appearance of the species). Spore-surface uppermost, of minute, hemispherical granules.

**G. granulosa** Fr. (Lat., with granules).
Near Lyndhurst. Church Place Inclosure.
On dead wood and fallen branches. Not common.

Family IV. THELEPHORACEÆ (" Leathery Fungi.")

Spore-surface more or less even, confined to one side of the erect or horizontal fungus.

Genus 1. **CRATERELLUS** Pers. (Lat., *crater*, a bowl, from the shape of the leading species). Funnel-shaped, erect.

**C. cornucopioides** (Linn.) Pers. (Lat., like the Horn of Plenty).
Whitley Wood. Allum Green. Ironshill. Knightwood. Ridley Wood.
In woods. Edible and very delicate. Fairly distributed.

Genus 2. **THELEPHORA** Ehrh. (Gr., *thele*, a teat, *phero*, I bear, from the sometimes papillate spore-surface). Spore-surface wrinkled.

**T. laciniata** Pers. (Lat., torn).
Denny Heath. Matley Heath. Ridley. Holmsley.
On stumps and stems of heather. Frequent.

**T. cristata** (Pers.) Fr. (*Soppittiella*,, Mass). (Lat., crested).
Nomansland. Denny.
On the ground and running over dead leaves and grasses. Not common.

**T. sebacea** Pers. (*Soppittiella*, Mass). (Lat., tallowy).
Hurst Hill.
On stumps, twigs and grasses in woods. Not common.

Genus 3. **STEREUM** Pers. (Gr., *stereos*, hard, from the nature of the plant). Effused or reflexed, spore-surface more or less smooth.

**S. multizonatum** B. and Br. (Lat., many-banded).
Denny. Hollands Wood. Perry Wood Inclosure.
On buried roots. Not common.

**S. hirsutum** (Willd.) Fr. (Lat., hairy [top]).
Holmsley. Dearleap. New Copse. Ironshill. Minstead. Bank. Holmhill. Ridley Wood, etc.
In woods and hedgerows, on stumps and fallen branches. Very common.

**S. ochroleucum** Fr. (Lat., ochrey-white).
Near Lyndhurst. Knightwood. Holmsley.
On dead trunks, stumps and fallen branches. Not common.

**S. purpureum** Fr. (Lat., purple [spore-surface]).
Ashurst. Buskett's Wood. Mark Ash. Holmsley. Perry Wood. Brockis Hill. Queen's Bower, etc.
On stumps and fallen branches, especially birch. Very common. Like *Polystictus abietinus*, but without pores.

**S. spadiceum** (Pers.) Fr. (Lat., date-brown [spore-surface]).
Bank. Ridley Wood.
On trunks, stumps and fallen branches. Not common. Bleeds on being scratched.

**S. sanguinolentum** (A. and S.) Fr. (Lat., bleeding).
Buskett's Wood.
On stumps and fallen branches of conifers Not common.

**S. rugosum** Pers. (Lat., wrinkled).
Busk tt's Lawn. Ashurst. Bolderwood. Hollands Wood. Mark Ash. Denny. Holmsley.
On stumps, rotten wood, and fallen branches. Common. Bleeds like the two preceding, but spore-surface pale and not on conifers.

Genus 4. **HYMENOCHÆTE** Lév. (Gr., *humen*, a membrane, *chaite*, long-flowing hair, from the coloured cystidia (projecting barren basidia) on the spore-surface.

**H. rubiginosa** (Dicks.) Lév. (Lat., rusty).
Busketts.
On decaying oak wood. Not common.

**H. fuliginosa** (Pers.) Lév. (Lat., sooty).
Denny. On stumps etc. Uncommon.

**H. corrugata** (Fr.) Lév. (Lat., wrinkled).
Holmsley.
On dead blackthorn. Uncommon.

Genus 5. **CORTICIUM** Pers. (Lat., *cortex*, bark, from the usual habitat of the species). Spore-surface uppermost, smooth and even, cracking when dry.

**C. sanguineum** Fr. (Lat., blood-coloured).
Bolderwood.
On fallen branches, etc. Uncommon.

**C. cæruleum** (Schr.) Fr. (Lat., sky-blue).
Bolderwood. Nomansland.
On decaying wood. Not common.

**C. calceum** (Pers.) Fr. (Lat., shoe).
Near Lyndhurst.
On stumps and fallen timber. Uncommon.

Genus 6. **PENIOPHORA** Cooke (Gr., *penio*, a shuttle, *phero*, I bear, from the shuttle-like cystidia). Spore-surface uppermost, velvety under pocket lens. Spores colourless.

**P. quercina** (Pers.) Cke. (Lat., of the oak).
Bank. Denny. Tantany Wood. New Copse. Mark Ash. Bolderwood. Holmhill, etc.
On fallen branches, especially of oak. Common. Pinkish, margin upturned, black beneath.

**P. gigantea** (Fr.) Mass. (Lat., gigantic).
Costicles. Near Lyndhurst. Dearleap. Pignal. Rhinefield. Bolderwood.
On pine-stumps and running over pine-needles. Common. Whitish, then brownish.

**P. cinerea** (Fr.) Cke. (Lat., ash-coloured).
Denny Wood. Bolderwood. New Copse. Queen's Bower. Brockis Hill, etc.
On fallen branches, etc.. Common

**P. incarnata** (Pers.) Mass (Lat., flesh-coloured).
Bolderwood. Tantany Wood.
On fallen branches, etc. Not common.

**P. ochracea** (Fr.) Mass. (Lat., ochre-coloured).
Near Lyndhurst. Tantany Wood. Bolderwood. Burley. Holmhill.
On rotten wood. Not uncommon.

Genus 7 **CONIOPHORA** DC. (Gr., *konis*, dust, *phero*, I bear, from the dusty appearance of the spore-surface). Spore-surface uppermost, powdery.

**C. puteana** (Schum.) Mass. (Lat., stinking).
Near Lyndhurst.
On rotten wood. Not noticed as common.

**C. sulphurea** (Fr.) Mass. (Lat., sulphur-coloured).
On rotten wood, etc. Not noticed as common.

Genus 8. **CYPHELLA** (Gr. *kuphos*, a goblet, the shape of the plants).

**C. muscigena** (Pers.) Fr. (Lat., growing on mosses).
Knightwood.
On mosses. Uncommon.

Family V. CLAVARIACEÆ ("Club and Coral Fungi.")
Spore-surface even, covering the whole of the erect fungus.

Genus 1. **SPARASSIS** Fr. (Gr., *sparasso*, to tear to pieces; from its appearance).
Forms a large tuft of many compressed branches, in the way of a cauliflower or sponge.

**S. crispa** (Wulf.) Fr. (Lat., curled).
Allum Green. Beaulieu Road. Rhinefield. Bolderwood. Ironshill.
On or near pine-stumps, in shade. Frequent. Branches curled.

**S. laminosa** Fr. (Lat., full of blades).
Holmsley.
On pine-stumps. Rare. Branches flattened.

Genus 2. **CLAVARIA** Vaill. (Lat., *clava*, a club, from the shape of many).
Upright, simple or branched.

**C. amethystina** Bull. (Lat., amethyst-coloured).
Picket.
In woods and pastures. Not common. Edible and delicious.

**C. fastigiata** Linn. (Lat., sloping to points).
Bolderwood. Racecourse. Emery Down. Mark Ash.
In pastures among short grass. Frequent. Yellow. Much branched.

**C. muscoides** Linn. (Lat., moss-like).
Near Minstead. Allum Green. Balmer Lawn.
In pastures among short grass. Frequent. Less branched than preceding. Base of stem woolly.

**C. cinerea** Bull. (Lat., ash-coloured).
Rhinefield. Balmer Lawn. Ridley. Mark Ash. Bolderwood, Denny Lodge Inclosure. Queen's Bower.
In woods. Common. Edible and delicious. Dove-grey to whitish.

**C. cristata** Pers. (Lat., crested).
Costicles. Balmer Lawn. Church Place Inclosure. Queen's Bower.
In woods. Frequent. Edible and delicious. Branchlets acute.

**C. rugosa** Bull. (Lat., wrinkled).
Rhinefield. Ramnor. Denny Lodge Inclosure. Minstead. Mark Ash.
In woods and pastures under trees. Common. Edible and delicious. Whitish, rather simple.

**C. aurea** Schaeff. (Lat., golden).
Bolderwood.
In woods. Uncommon. Edible.

**C. formosa** Pers. (Lat., beautiful).
Near Hangersley.
In woods, etc. Uncommon. Edible.

**C. rufescens** Schaeff. (Lat., turning red).
Near Lyndhurst.
On the ground. Rare.

**C. abietina** Pers. (Lat., of spruce-trees).
Near Lyndhurst. Bolderwood. Burley New Inclosure.
In woods under conifers. Not common. Edible. Greenish.

**C. flaccida** Fr. (Lat., limp).
Rhinefield.
In woods under conifers. Uncommon. Edible. Ochraceous-green tinge.

**C. fusiformis** Sow. (Lat., spindle-shaped).
Knightwood. Denny. Ironshill. Mark Ash. Ridley Wood. Burley.
In woods and pastures. Common. Edible. Rich yellow, clustered, tops spiny.

**C. inæqualis** Fl. Dan. (including **dissipablis** Britz). (Lat., unequal).
Balmer Lawn. Denny Wood. Church Place Inclosure. Brockenhurst Park, etc.
In grassy places in woods and pastures. Very common. Edible. Yellow, fragile, unequal, tops blunt.

**C. luteo-alba** Rea. (Lat., yellow and white).
Bank. Mark Ash.
Among short grass. Not noticed as common. Like *inæqualis* but tops white.

**C. argillacea** (Pers.) Fr. (Lat., clay-coloured).
Denny Heath.
On sandy heaths, etc. Not common. Very pale yellowish.

**C. fragilis** Holmsk. (Lat., easily broken).
Bank. Balmer Lawn. Emery Down. Holmsley. Burley.
Among short grass in woods and pastures. Frequent. White, simple, twisted.

Genus 3. **CALOCERA** Fr. (Gr. *kalos*, beautiful, *keras*, a horn, from the shape of some of the species). Resembles *Clavaria*, but rather gelatinous, viscid.

**C. viscosa** (Pers.) Fr. (Lat., sticky).
Ironshill. Tantany Wood. Rhinefield. Bolderwood. Pignal. Queen's Bower. Holmsley. Holmhill.
On stumps of conifers. Common. Branched.

**C. cornea** (Batsch) Fr. (Lat., horny).
Bank. Buskett's Wood. Denny. Holmhill.
On trunks and fallen branches. Frequent. Simple, clustered.

**C. stricta** Fr. (Lat., drawn tight).
Near Lyndhurst. Tantany Wood. Denny Lodge Inclosure.
On stumps, fallen branches, etc. Not uncommon. Simple, solitary.

## Family VI. TREMELLACEÆ ("Jelly Fungi")

Substance gelatinous when moist, horny when dry.

Genus 1. **AURICULARIA** Bull. (Lat., *auricula*, the ear, from the form of the species). Resembles *Stereum*.

**A. mesenterica** (Dicks.) Pers. (including **lobata** Somm). (Lat., like entrails)
Brockenhurst. Buskett's. Mark Ash. Whitley Wood. Rhinefield.
On stumps and decaying trunks, especially of elm. Common.

Genus 2. **HIRNEOLA** Fr. (Lat., a small jug, from the shape).

**H. auricula-Judæ** (Linn.) "Jew's-ear."
Buskett's Lawn.
On living elders, sometimes beech and elm. Not common.

Genus 3. **EXIDIA** Fr. (Gr., *exidio*, I exude, from the nature of the receptacle). Cup-shaped, truncate, or irregularly lobed.

**E. glandulosa** (Bull.) Fr. (Lat., nut-like).
Ashurst. Knightwood. Hollands Wood. Nomansland.
On dead branches of oak, etc. Not uncommon. Grey or brown, then black.

**E. recisa** (Ditm.) Fr. (Lat., cut back).
Denny Wood.
On dead branches of willow. Uncommon. Amber-brown.

**E. albida** (Huds.) Bref. (Lat., whitish).
Rhinefield. Ringwood. Mark Ash. Bolderwood. Bratley Wood. Hollands Wood. Woodhurst.
On fallen branches. Common. Dirty white.

Genus 4. **TREMELLA** (Dill.) Fr. (Lat., *tremo*, I tremble, in allusion to its gelatinous consistency). Lobed, or brain-like.

**T. fimbriata** Pers. (Lat., fringed; from the margin).
Denny.
On dead branches. Uncommon. Blackish-olive,

**T. frondosa** Fr. (Lat., leafy).
Rhinefield. Church Place Inclosure. Mark Ash.
On trunks and fallen branches of oak. Not uncommon. Large, pinkish-amber.

**T. lutescens** Pers. (Lat., yellowish).
Hollands Wood. Denny Lodge Inclosure. Ridley Wood.
On fallen branches. Not common. Pale yellow.

**T. mesenterica** Retz. (Lat., like entrails).
Ramnor. Queen's Bower. Denny. Hurst Hill. Mark Ash. Woodhurst. Holmhill.
On dead gorse stems. Common. Orange-yellow.

**T. intumescens** Sm. (Lat., swelling up).
Rhinefield. Near Lyndhurst. Holmhill.
On trunks of beech, etc. Not common. Brown to black.

Genus 5. **DACRYOMYCES** Nees. (Gr., *dakru*, a tear, *mukes*, a fungus, from the tear-like habit). Minute, cushion-like, clustered.

**D. deliquescens** (Bull.) Duby. (Lat., melting).
Brockenhurst. Emery Down. Bank. Minstead. Rhinefield. Whitley Wood, etc.
On dead and worked wood. Very common. In perfection in winter. Orange-yellow.

**D. stillatus** Nees. (Lat., dropping).
Brockenhurst. Holmsley. Burley. Ashurst. Near Lyndhurst. Bank. etc., etc.
On dead and worked wood. Very common. Smaller than *D. deliquescens* and deeper orange.

## Order II. *PILACREÆ.*

A small and anomalous group, regarded as partaking somewhat of the characters of both the Hymenomycetes and the Gasteromycetes.

Genus 1. **PILACRE** Fr. (Gr., *pileos*, cap, and *akros*, summit). Minute, club-shaped.

**P. faginea** B. and Br. (Lat., of the beech).
Picket Post.
On rotten wood. Rare. Stems blackish.

**P. Petersii** B. and C. (Commemorative).
Denny Lodge Inclosure. Woodfidley.
On dead trunks of beech in great abundance, otherwise rare. Stems whitish.

## Order III. *GASTEROMYCETES.*

Spores enclosed till mature.

### Family I. PHALLOIDACEÆ ("Stinkhorns").

Coat (peridium) with a central gelatinous layer. Spores immersed in a fetid gluten.

Genus 1. **ITHYPHALLUS** Fr. (Gr., *ithys*, and *phallos*, from its phallic resemblance). Pileus netted, on stem-like receptacle.

**I. impudicus** (Linn.) Fr. (Lat., shameless). "Common Stinkhorn."
Woodfidley. Bolderwood. Ridley. Burley. Emery Down.
In woods, etc., especially under firs. Frequent.

Genus 2. **MUTINUS** Fr. (Another phallic allusion).

**M. caninus** Fr. (Lat., of the dog).
Rhinefield. Knightwood. Woodfidley. Mark Ash. Holmsley.
In woods. Not uncommon.

## Family II. NIDULARIACEÆ (" Bird's-nest Fungi ").

Small, cup-shaped, containing mall bodies (peridiola enclosing spores.)

Genus 1. **CYATHUS** Hall. (Gr., *kuathos*, a cup). Peridium of three layers.

**C. striatus** (Huds.) Willd. (Lat., ridged).
Near Brockenhurst. Dame's Slough Inclosure.
On twigs on the ground. Uncommon.

Genus 2. **CRUCIBULUM** Tul. (Lat., a melting-pot). Peridium of two layers.

**C. vulgare** Tul. (Lat., common).
Rhinefield. Woodfidley.
On sticks. Not common.

Genus 3. **SPHÆROBOLUS** Tode. (Gr., *sphaira*, a ball, *bole*, throw; because the solitary peridiolum is ejected at maturity).

**S. stellatus** Tode. (Lat., starry; the way it splits).
Bramshaw Wood.
On horse-dung., etc. Not common in the Forest.

Genus 4. **THELEBOLUS** Tode. (Gr., *thele*, a nipple, *bole*, throw, from the way the peridiolum protrudes).

**T. terrestris** (A. and S.) W. G. S. (Lat., of the earth).
Ironshill.
On wood and on the ground. Uncommon.

## Family III. LYCOPERDACEÆ (" Puff-balls ").

Peridium thin; gleba becoming powdery.

Genus 1. **GEASTER** (Gr., *ge*, earth, *aster*, star, because the outer coat splits in a star-like manner). " Earth stars."

**G. fimbriatus** Fr. (Lat., fringed).
Rhinefield.
On the ground. Uncommon.

**G. hygrometricus** (Pers.) Fr. (Gr., water-indicating).
Rhinefield.
On the ground. Rare.

Genus 2. **LYCOPERDON** Tournef. (Gr., *lukos*, a wolf, *perdon*, I break wind, from an old belief that puff-balls grew from the dung of the wolf). Outer coat flaccid, opening in a small hole at top.

**L. perlatum** Pers. (Lat., very wide; from the shape).
Buskett's Lawn. Beaulieu Heath. New Copse. Woodfidley. Minstead. Bank. Ridley Wood. Mark Ash. Ramnor, etc.
In woods and pastures. Common. Edible and delicious. Spines erect, each surrounded by warts. Often in pairs.

**L. hiemale** Bull. (= **depressum** Bon.) (Lat., of winter).
Bank. Wootton. Balmer Lawn. Church Place Inclosure. Emery Down. Allum Green.
In pastures, on commons, etc. Common.

**L. cælatum** Bull. (Lat., chisled, from the tesselate coat).
Blackwater. Denny Heath.
In pastures. Not common. Tesselated. Often large. Empty base often seen in winter.

**L. pyriforme** (Schaeff.) (Lat., pear-shaped).
Denny Lodge Inclosure. Brockenhurst Park. New Copse. Ironshill. Ashurst. Vinney Ridge. Ridley Wood, etc.
On stumps, etc. Common. Edible and delicious. Nearly smooth. Often in large clusters.

**L. gemmatum** Batsch. (Lat., gemmed; from the warts).
Ironshill. Beaulieu Heath. Dearleap Plantation. New Copse. Bolderwood.
In woods and thickets. Frequent. Spines drawn together in clusters.

**L. echinatum** Pers. (Lat., spiny like the sea-urchin).
Denny Wood.
Among leaves in woods. Uncommon. Spines longer than in *L. gemmatum*.
**L. excipuliforme** (Scop.) Pers. (Lat., mattress-shaped).
Denny.
In wood, etc. Uncommon. Edible.
**L. saccatum** Vahl. (Lat., bag-shaped).
Near Lyndhurst.
In woods. Uncommon. Edible and delicious.

Family IV. SCLERODERMACEÆ ("Earth-balls").
Peridium thick, rupturing irregularly. Gleba not becoming powdery.

Genus 1. **SCLERODERMA** (Gr., *skleros*, hard, *derma*, skin, from the firm peridium). Peridium warted.
**S. vulgare** Fl. Dan. (Lat., common).
Beaulieu Heath. Denny.
In woods, etc. Very common. Gleba purplish black.
Busketts. Woodfidley. Holmsley. Hollands Wood. Ashurst. Mark Ash. Vinney Ridge, etc.
**S. verrucosum** (Bull.) Pers. (Lat., warted).
Bank. Bolderwood. Denny Wood. Burley New Inclosure. Holmsley.
In woods, etc. Not uncommon. Gleba umber.

Family V. HYMENOGASTRACEÆ ("False Truffles").
Subterranean.

Genus 1. **RHIZOPOGON** (Gr., *rhiza*, root, *pogon*, beard, from the root-like fibres investing the species).
**R. lutescens** Fr. (Lat., becoming yellow, yellowish).
Near Rushpole Wood. Ashurst. Holmsley.
In open places in woods, often exposed. Not uncommon.
**R. rubescens** Tul. (Lat., becoming red).
Bolderwood. Woodlands Inclosure. Ironshill.
In open places in woods, often exposed. Not uncommon.

Order III. *UREDINALES* ("Rust Fungi").
Parasitic on higher plants.

**Phragmidium album** Kuehn.
Near Lyndhurst.
**Uredo Muelleri** Schroet.
Near Lyndhurst.

## Class III. ASCOMYCETES.

Spores in mother-cells termed asci.

Order I. *PYRENOMYCETES* ("Capsular Fungi").
Asci enclosed in a flask-shaped perithecium.

**Nectria cinnabarina** (Tode.) Fr.
On dead branches and twigs. Common.
**N. coccinea** (Pers.) Fr.
Picket Post. Mark Ash. On fallen branches, etc.
**N. ditissima** Tul. "Apple-tree Canker."
Woodfidley.
**N. inaurata** B. and Br.
Near Lyndhurst. On holly.
**N. aquifolii** (Fr.) Berk.
Holmsley. On holly.

**N. peziza** (Tode) Fr.
Woodhurst. On rotten wood.
**Hypomyces rosellus** (A. and S.) Tul.
Ashurst Wood. Burley. Holmsley. On decaying fungi.
**Hypocrea rufa.**
Bank. On dead wood.
**Claviceps microcephala** (Wallr.) Tode.
Denny, etc. Widely distributed. On *Molinia.*
**Cordyceps entomorhiza** (Dicks.) Link.
Near Brockenhurst. On buried chrysalis.
**C. militaris** (Linn.) Link.
Rhinefield. Queen's Bower. Denny. Whitemoor.
On buried chrysalides.
**C. capitata** (Holmsk.) Link.
Costicles. Ramnor. Denny. Bolderwood.
On *Elaphomyces granulatus.*
**Sporormia minima** Aursw.
Bolderwood. On rabbit-dung.
**Lasiosphæria ovina** Ces. et de Not.
Bolderwood. On rotten wood.
**Rosellinia clavariæ** (Tul.) Wint.
Brockenhurst Bridge. On *Clavaria.*
**Quarternaria Persooni** Tul. Conidial form.
Near Lyndhurst. On fallen beech.
**Diatrypella quercina** (Pers.) Nitschke.
Very common everywhere. On fallen oak branches.
**Diatrype disciformis** (Hoffm.) Fr.
Mark Ash. Rhinefield. On fallen beech branches.
**Hypoxylon fuscum** (Pers.) Fr.
Very common. On fallen branches and twigs, especially hazel.
**H. coccineum** Bull.
Very common. On beech logs.
**Daldinia concentrica** Bolt.
Picket Post. Woodice. On trunks and stumps, especially ash.
**Ustulina vulgaris** Tul.
Bank. Ridley Wood. On stumps and logs.
**Poronia punctata** (Linn.) Fr.
Allum Green. Balmer Lawn. Holmsley. Bramshaw Wood. Fritham Plain. On horse-dung.
**Xylaria hypoxylon** (Linn.) Grev.
Very common. On stumps, chips, posts, etc.
**X. polymorpha** (Pers.) Grev.
Vinney Ridge. On stump.
**Phyllactinia guttata** Lev.
Common. On living leaves of oak.
**Elaphomyces granulatus** Fr.
Costicles. Ramnor. Denny. Bolderwood. Subterranean, disclosed by its parasite *Cordyceps capitata.*
**Dichæna quercina** (Pers.) Fr.
On living and dead trunks and branches of oak. Very common.
**D. faginea** Fr.
On living and dead trunks and branches of beech. Very common.

## Order II. *DISCOMYCETES.*

Ascophore flat or cup-shaped.

**Helvella crispa** (Scop.) Fr.
Ramnor. On the ground. Edible.
**H. lacunosa** Afzl.
Holmsley Inclosure. Among short grass near trees. Edible.
**H. elastica** Bull.
Ironshill. In woods. Edible.

**Geoglossum glutinosum** Pers.
Holmsley Inclosure. Ironshill. Among grass.
**G. glabrum** Pers.
Ocknell Arch. On the ground among trees.
**G. hirsutum** Pers.
Rhinefield. Picket Post. Among grass.
**Mitrula phalloides** Chev.
Holmsley. Obere. Matley. On decaying leaves, etc.
**M. viride** Karst.
Bank. Under trees, etc.
**Leotia lubrica** Pers.
Rhinefield. Buskett's Lawn. On the ground.
**Acetabula vulgaris** Fckl.
Near Brockenhurst. On roadside.
**Geopyxis coccinea** (Jacq.) Mass. "Scarlet Cup-moss."
Near Lyndhurst. Woodhurst. On decaying twigs among leaves.
**Peziza vesiculosa** (Bolt.) Bull.
Near Hangersley. On refuse.
**P. sepiatra** Cke.
Near Queen's Bower. In shady place.
**P. ampliata** Pers.
Ironshill. Mark Ash. On rotten wood.
**P. badia** Pers.
Beaulieu Road. Brockis Hill. On the ground. Edible.
**P. succosa** Berk.
Queen's Bower. On the ground.
**Otidea aurantia** (Müll.) Mass.
Bank. Hurst Hill. Denny. Rhinefield. On gravelly ground, etc.
**O. luteo-nitens** Mass.
Nomansland. On the ground.
**Barlæa violascens** Mass.
Near Lyndhurst. Among moss.
**Humaria rutilans** (Fr.) Sacc.
Near Lyndhurst. Among moss.
**H. granulata** (Bull.) Quél.
Common. On horse and cow dung.
**Dasyscypha virginea** (Batsch) Fckl.
Costicles. On rotten wood.
**D. hyalina** (Pers.) Mass.
Near Lyndhurst. On decaying wood, inside bark, etc.
**D. calycina** (Schum.) Fckl.
Near Lyndhurst. On larches.
**Lachnea scutillata** (Linn.) Gill.
Obere. Vinney Ridge. Denny. On stumps and rotten logs.
**Tapesia sanguinea** (Pers.) Fckl.
Ramnor. On rotten fir-wood, staining it red.
**Chlorosplenium æruginosum** (Oed.) de Not.
Denny Lodge Inclosure, ascophores numerous: the mycelium, which stains dead wood deep green, is found all over the Forest.
**Ciboria ochroleuca** (Bolt.) Mass.
Knightwood. On fallen branches of oak.
**C. echinophila** (Bull.) Sacc.
Near Lyndhurst. On decaying chestnut burrs.
**Helotium claro-flavum** (Grev.) Berk.
Matley Wood. Rhinefield. On stumps and fallen branches.
**H. virgultorum** (Vahl.) Karst. var. **fructigenum** (Bull.) Karst.
Church Place Inclosure. On fallen beech-mast.
**Mollisia cinerea** (Batsch) Karst.
Buskett's Wood. Picket Post. On dead wood.
**Ascobolus furfuraceus** Pers.
Buskett's Wood. Nomansland. On cow-dung.

**Orbilia leucostigma** Fr. var. **xanthostigma** Fr.
Mark Ash. On dead wood.
**O. luteo-rubella** Karst.
Near Lyndhurst. On rotten bark, etc.
**Coryne urnalis** (Nyl.) Sacc.
Picket Post. On stumps and dead wood.
**C. sarcoides** (Jacq.) Tul.
Bank. Buskett's Wood. Mark Ash. Burley. Holmhill, etc.
On stumps and felled timber.
**Bulgaria polymorpha** (Oed.) Wetts.
Queen's Bower. Bank. Busketts. Denny. Ashurst, etc., on dead trunks.
**Propolis faginea** (Schrad.) Karst.
Near Lyndhurst. On fallen branches, etc.
**Coccomyces coronatus** (Schum.) de Not.
Near Lyndhurst. On dead oak leaves.
**Phacidium multivalve** (DC.) Kze. and Schmidt.
Very common. On dead holly leaves.
**Trochila ilicis** (Chev.) Crouan.
Very common. On dead holly leaves.
**Rhytisma acerinum** (Pers.) Fr.
Holmsley. Denny. Dearleap, etc. On sycamore leaves.

## Class IV. PHYCOMYCETES (Moulds).

Microscopic fungi, with sexual reproduction.

**Spinellus fusiger** (Lk.) Van Tiegh.
Costicles. On decaying *Mycena*.

## Class V. DEUTEROMYCETES. (Imperfect Fungi).

Microscopic; probably all forms of higher fungi.

**Sepedonium chrysospermum** Fr.
Common. On decaying *Boleti*, etc.
**Bispora monilioides** Cda.
Nomansland. On wood.
**Coryneum Kunzei** Corda.
Matley Wood. On oak twigs.

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# MYCETOZOA.

**Spore-plants with animal affinities.**

**Ceratiomyxa mucida** Schroet.
Near Lyndhurst. On rotten logs.
**Badhamia utricularis** Berk.
Mark Ash. On old stumps, feeding on woody fungi.
**Physarum viride** Pers.
Obere. On rotten stumps.
**P. nutans** Pers.
Rhinefield. Picket Post. Vinney Ridge. Near Lyndhurst. Denny Wood. On rotten wood.
var. **leucophæum.**
Denny. On rotten stump.
**P. compressum** A. and S.
Lyndhurst. On dead wood, bark and leaves.
**P. straminipes** List.
Lyndhurst. On old straw and dead leaves.

**P. contextum** Pers.
Lyndhurst. On dead leaves and twigs.
**Fuligo septica** Gmel. (White).
Near Lyndhurst. On rotten wood, tan, etc.
**Craterium pedunculatum** Trent.
Picket Post. Near Lyndhurst. On dead leaves.
**C. leucocephalum** Ditm.
Near Lyndhurst. On dead leaves, etc.
**C. mutabile** Fr.
Nea Lyndhurst. On dead leaves.
**Leocarpus vernicosus** Link.
Rhinefield. Ramnor. Denny Wood. On dead leaves, etc.
**Chondrioderma spumarioides** Rost.
Near Lyndhurst. On leaves.
**Didymium difforme** Duby.
Denny. On dead leaves.
**D. Clavus** Rost.
Near Lyndhurst. On dead leaves.
**D. farinaceum** Schrad.
Near Lyndhurst. On dead leaves and bark.
**D. nigripes** Fr.
Near Lyndhurst. On dead leaves.
**D. effusum** Link.
Near Lyndhurst. Denny. On dead leaves.
**Spumaria alba** DC.
Brockis Hill. On grass, dead leaves, etc.
**Stemonitis fusca** Roth.
Near Lyndhurst.
**S. splendens** Rost. var. **flaccida**.
Bolderwood. On face of old pulled-up fir roots.
**Comatricha obtusata** Pers.
Near Lyndhurst. On dead wood.
**C. typhoides** Rost.
Vinney Ridge. On rotten wood.
**C. Persoonii** Rost.
Near Lyndhurst. On dead leaves.
**Enerthenema elegans** Bowm.
Near Lyndhurst. On dead wood.
**Lamproderma physarioides** Rost.
Denny. On fir wood and moss.
**L. irideum** Mass.
Near Lyndhurst. On dead wood.
**Cribraria argillacea** Pers.
Denny. On dead wood.
**C. aurantiaca** Schrad.
Near Lyndhurst. On dead fir wood.
**Dictydium umbilicatum** Schrad. var. **fuscum.**
Near Lyndhurst. On dead wood.
**Licea flexuosa** Pers.
Near Lyndhurst. On dead wood.
**Dictydiæthalium plumbeum** Rost.
Denny. On dead wood.
**Reticularia Lycoperdon** Bull.
Rhinefield. On stumps.
**Trichia affinis** de Bary.
Ridley Wood. On stumps.
**T. persimilis** Karst.
Denny. On stumps.
**T. varia** Pers.
Bolderwood. Picket Post. Near Lyndhurst. On dead wood.
**T. contorta** Rost.
Denny. Near Lyndhurst. On dead wood.

**T. fallax** Pers.
Buskett's Wood. Near Lyndhurst. On dead wood.
**T. Botrytis** Pers.
Denny. Near Lyndhurst. On dead wood.
**H. rubiformis** Lister.
Denny. On dead wood.
**Hemitricha clavata** Rost.
Denny. On dead wood.
**Arcyria ferruginea** Santer.
Denny. On dead wood.
**A. albida** Pers.
Near Lyndhurst. On dead wood and leaves.
var. **pomiformis.**
Near Lyndhurst. On dead wood and leaves.
**A. punicea** Pers.
Near Lyndhurst. On rotten wood.
**A. incarnata** Pers.
Ramnor. Near Lyndhurst. On dead wood and sticks.
**A. flava** Pers.
Denny. Near Lyndhurst. On rot en wood.
**Lycogala flavo-fuscum** Rost.
Near Lyndhurst. On dead birch.
**L. miniatum** Pers.
Bolderwood. Vinney Ridge. Near Lyndhurst. On dead wood.

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